PAPER TRADE JOURNAL

THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY AND THE PIONEER PUBLICATION IN ITS FIELD

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Axioms

The whole is equal to the sum of its parts—and so the accumulated experience gained from fifty-two years of continual service rendered the Pulp and Paper Industry is reflected in our present ability to serve.

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—INCORPORATED—

WOOD PULP

22 EAST 40th STREET NEW YORK, N. Y.

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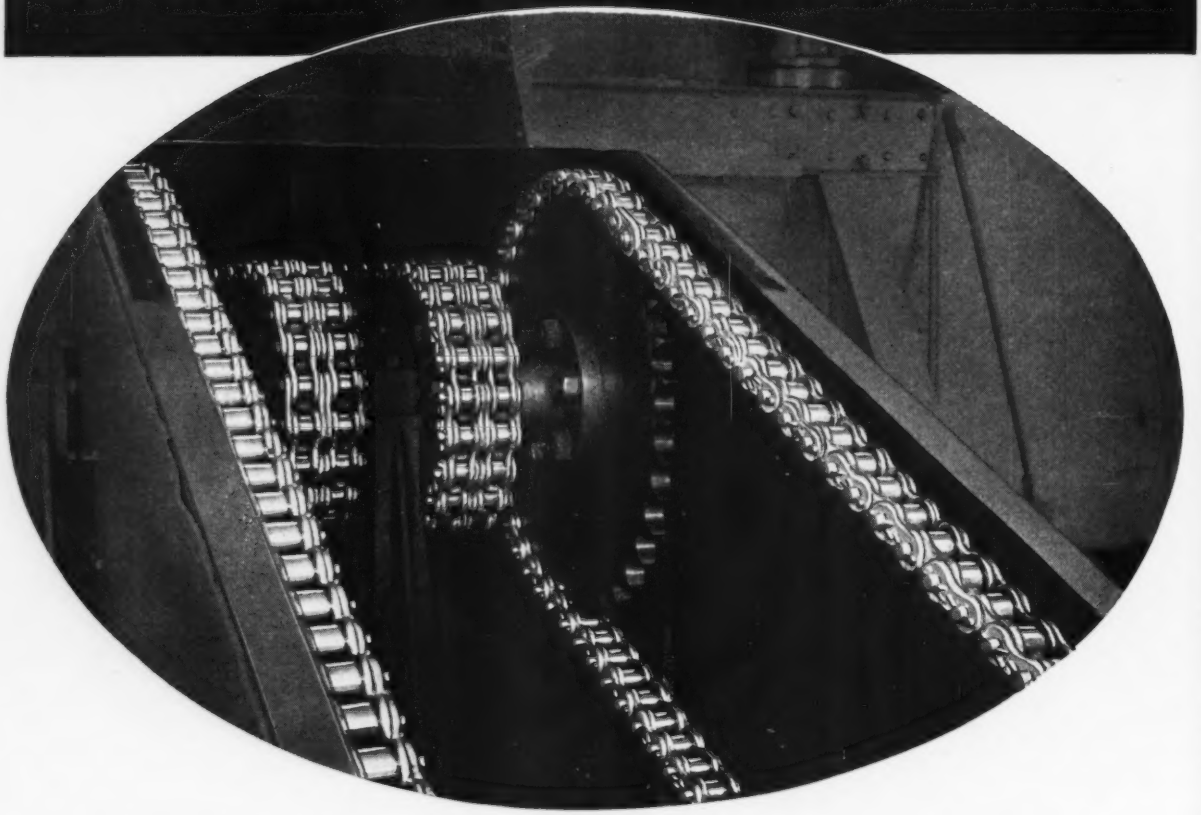
APRIL
14
1938

Vol. CVI
No. 15

A DEVELOPMENT OF 63 YEARS EXPERIENCE IN THE ART OF FINE CHAIN MAKING



● Link-Belt Silverlink Roller Chain represents the highest point of accomplishment in roller chain development — a product of the leader in the art of chain manufacture. Its sterling qualities — are symbolized by its modern appearance — its silvered sidebars and black curled rollers. There is Link-Belt quality in every foot of it.

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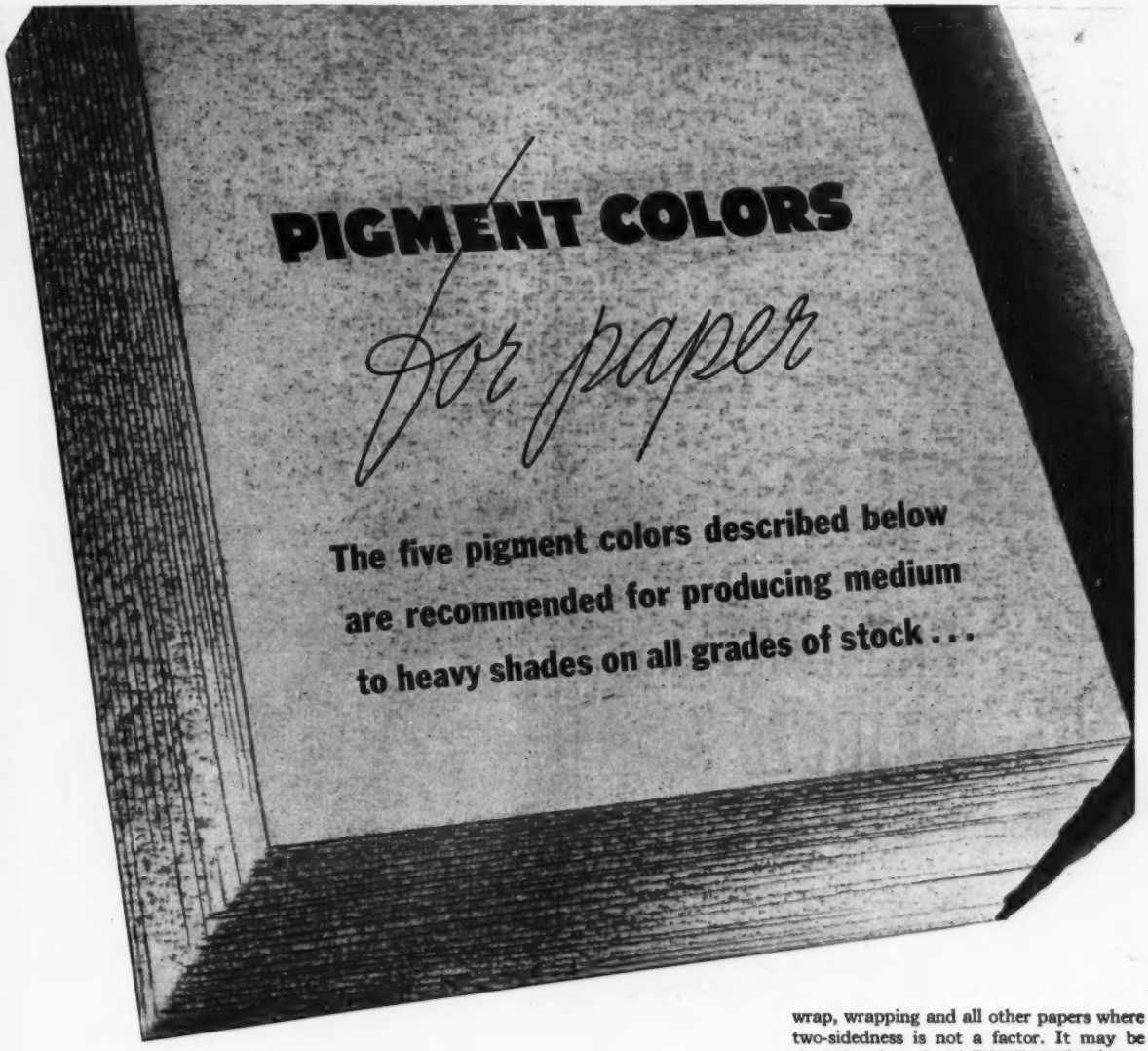
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for paper
The five pigment colors described below
are recommended for producing medium
to heavy shades on all grades of stock . . .

LITHOSOL* Fast Yellow HV 20% Paste
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THESE products possess good fastness to acid, alkali and chlorine, are very fast to light and will not darken on exposure as will chrome and canary yellows. They will produce bright, greenish yellow shades on coffee bag, wrapping and other similar type papers. When used in combination with Du Pont Paper Blue S, various bright shades of green on tire wrap and wrapping papers may be produced. Both products are satisfactory for coating as well.

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A WELL-DISPERSED pigment particularly suitable for producing fast-to-light green shades in wrapping, tire wrap and similar papers. It is also very fast to acid, alkali and chlorine and may be added dry to the beater, developing maximum strength rapidly.

Du Pont Paper Blue S

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The HALOPONT* and PONSOL* blues are particularly recommended for the tinting of whites.

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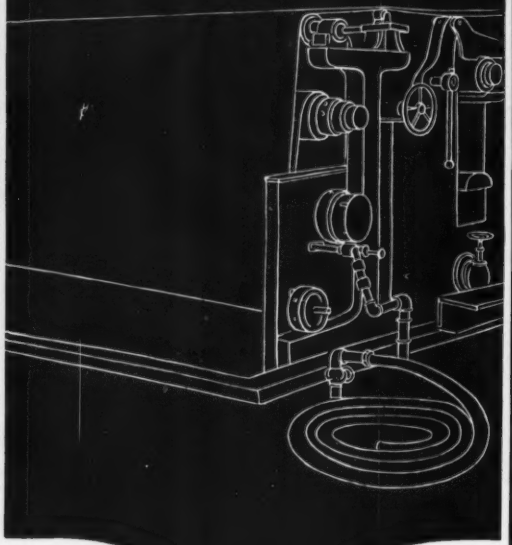

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It's not only the superiority of the felt itself that has earned Orr its enviable reputation. It is also the ability of Orr representatives to select the right felt for the job.

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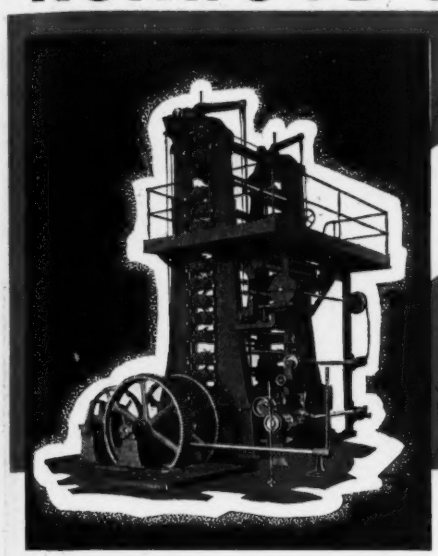

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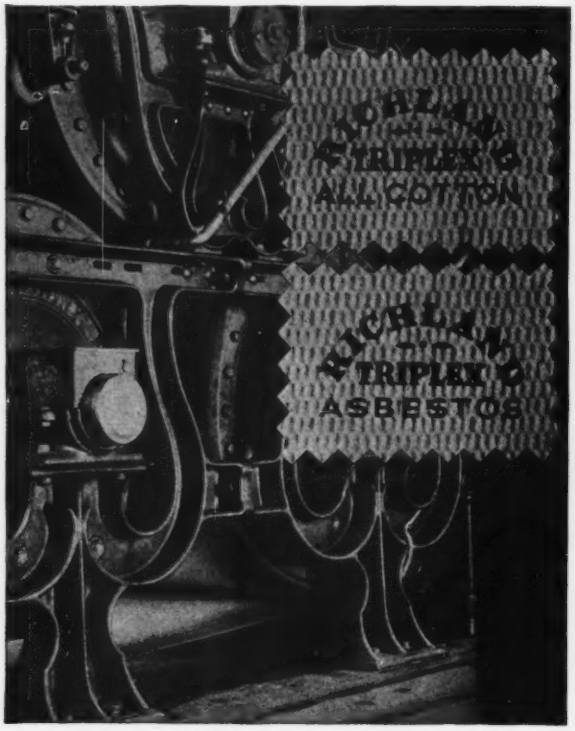

• Uniform porosity in dryer felts determines, to a large degree, whether or not you are enjoying economy in your steam consumption. RICHLAND TRIPLEX all Cotton or Asbestos felts are woven with such unerring accuracy that uniformity is an inevitable result. Shrinkage and stretch have been reduced to a minimum which adds considerably to the uniformity of porosity in any well woven dryer felt. Specify RICHLAND TRIPLEX. They are truly precision fabrics.

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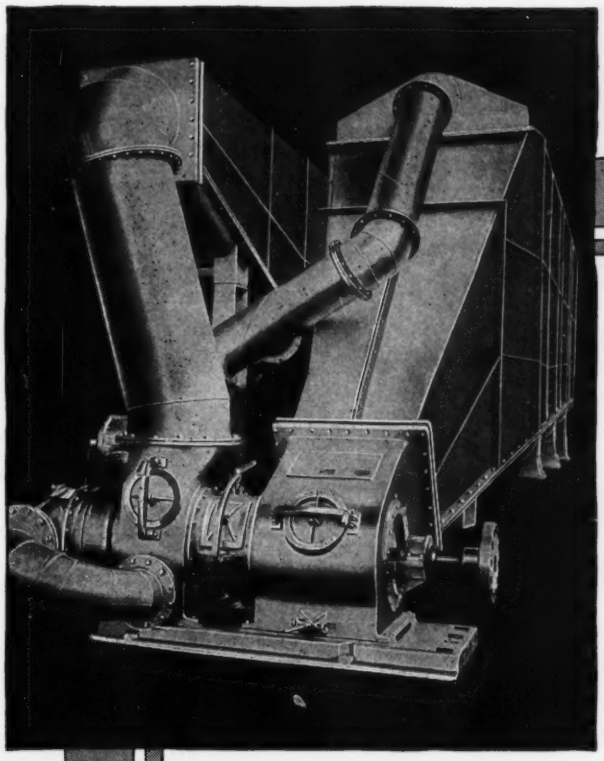
Meet the New Tugboat Annie



SHARTLE

Just because Tugboat Annie is miles ahead of other pulpers is no reason for her to rest on her oars. No sir, not Annie. Instead, she has undergone a design improvement that will enable her to send an even greater golden stream of savings flowing into company coffers.

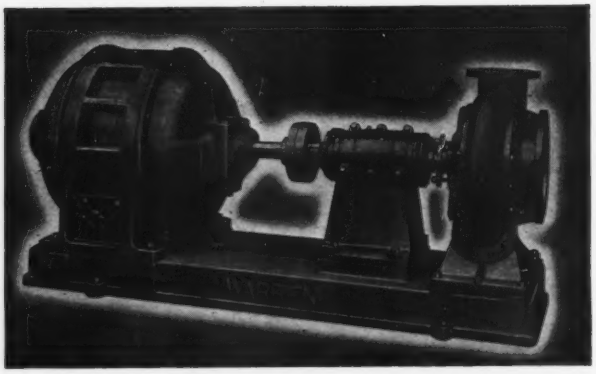
The recent improvement referred to is a new stock by-pass arrangement. As one can see from the illustration, the stock used to submerge newly charged pulp laps goes direct to the overflow rail instead of taking the same path as the stock sent back for recirculation. This was made possible by designing a special impeller which efficiently pumps both streams of stock. Added savings on power result.

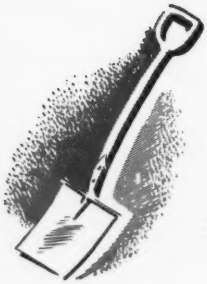
It is true that this isn't a major change, but, nevertheless, it is in line with Shartle policy of "forward march". In other respects, Tugboat Annie is still the same old pulping fool. She's still so good that one pass and pulp laps are reduced to the size of quarters. 10,000 healthy wallops a minute is the reason . . . 10,000 healthy wallops a minute despite only one moving part.

Tugboat Annie is a modern industrial amazon. She's literally the answer to a mill man's prayer for a machine that would pulp fast, uniformly and thoroughly. No wonder Annie has attracted more attention than any other paper mill machinery development in the last decade. We're happy to say that this interest has been followed by orders and that seventy are now in service throughout the world.

You, too, can put Annie to work in your mill saving plenty of money. Consider her not only for unparalleled pulping, but also for bleaching and deinking. Shartle Brothers Machine Co., Middletown, O. Division of the Black-Clawson Company.

SHARTLE BROTHERS





30 YEARS OF EXPERIENCE AND A SHOVEL

Here's a case where a mill superintendent and a Warren engineer used brainwork—and a shovel—to lick a tough stock-handling problem. The stock: 6% ground wood. The method: a shovelful of stock was placed on a 45 degree incline. It did not slide, flow, or move in any way. A second, then a third on top of the other two caused the whole mass to slide down the steep incline. As a further check, with an improvised pipe elbow, it was shown that *head* was most important.

On the installation, which has for many years been in successful operation, the pump suction opening was coupled directly to a tiled chest with a sloping bottom, thus making sure that stock would reach the impeller.

Common sense? It was rather the uncommon sense that Warren engineers have developed over many years, the *knowing how* to fit stock pumps to the individual job. Bring your stock handling problem to Warren.

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WARREN STEAM PUMP CO., INC. **WARREN, MASSACHUSETTS**

"NON-USERS ARE THE LOSERS"

TENAX FELTS

FINISH AND SPEED

MEN AND MILLS

Every time a new mill goes into production we find old faces in new places. Also find that TENAX FELTS go along. Both men and method have won promotion on the basis of "good work well done." Both now have new opportunities to prove their superiority.

"Non-Users Are The Losers"

LOCKPORT FELT COMPANY

NEWFANE, N. Y.–U. S. A.

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HELLER & MERZ
Technical Service

COMPLEXIONS
that won't run . . .
for Paperboard Containers

With new uses being found almost daily for colored paperboard containers, their future seems assured—except for the difficulty of preventing bleeding on exposure to moisture. This has been ruining their attractive appearance, staining the gloves, clothing and floors of purchasers.

For paperboard manufacturers who came to our Technical Service Division for help, good news was waiting. In anticipation of just such a need, a calendar stain for paperboard had been added to the Heller & Merz line of dyes. It covers a wide range of brilliant shades—and most important of all, insures greater fastness to bleeding than any previous calendar stain.

Obviously, the answer to every problem in the use of dyes may not be ready to hand as in this case. But the assistance of our Technical Service Division is yours for the asking, whether or not you now use Heller & Merz products. It may help you, as it has helped others on many occasions, to find a practical and perhaps more economical way to use dyes in your business. Simply write or wire our main office or nearest branch office, and a member of our staff will be sent promptly and without obligation to talk over your problems with you.

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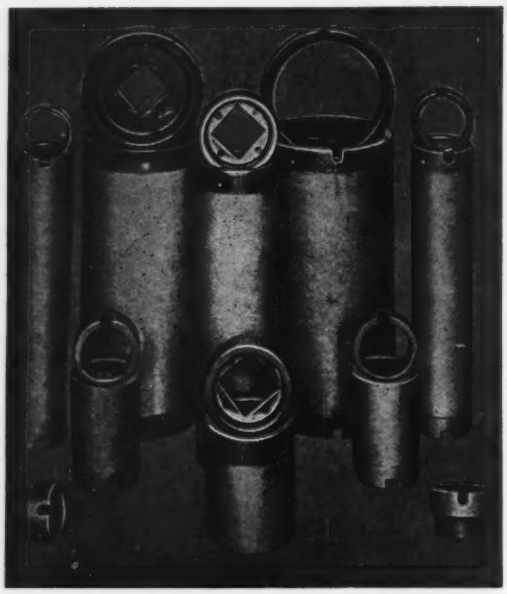

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Straight wound paper cores made in sizes from 2" to 10" inside diameter with any thickness wall required.

Long draw protected slot caps of heavy gauge steel in all standard sizes.

Heavy duty caps with reenforced square hole. This new patented feature of reenforcement gives added strength and durability.

Samples of caps or cores will be gladly submitted.

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CORINTH, N. Y.

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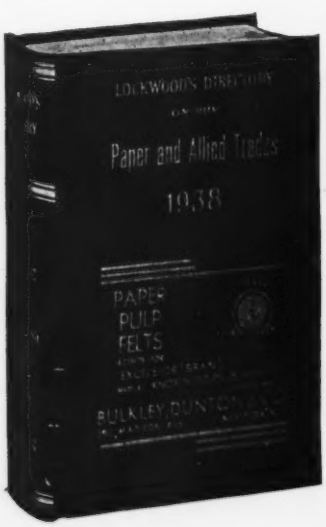

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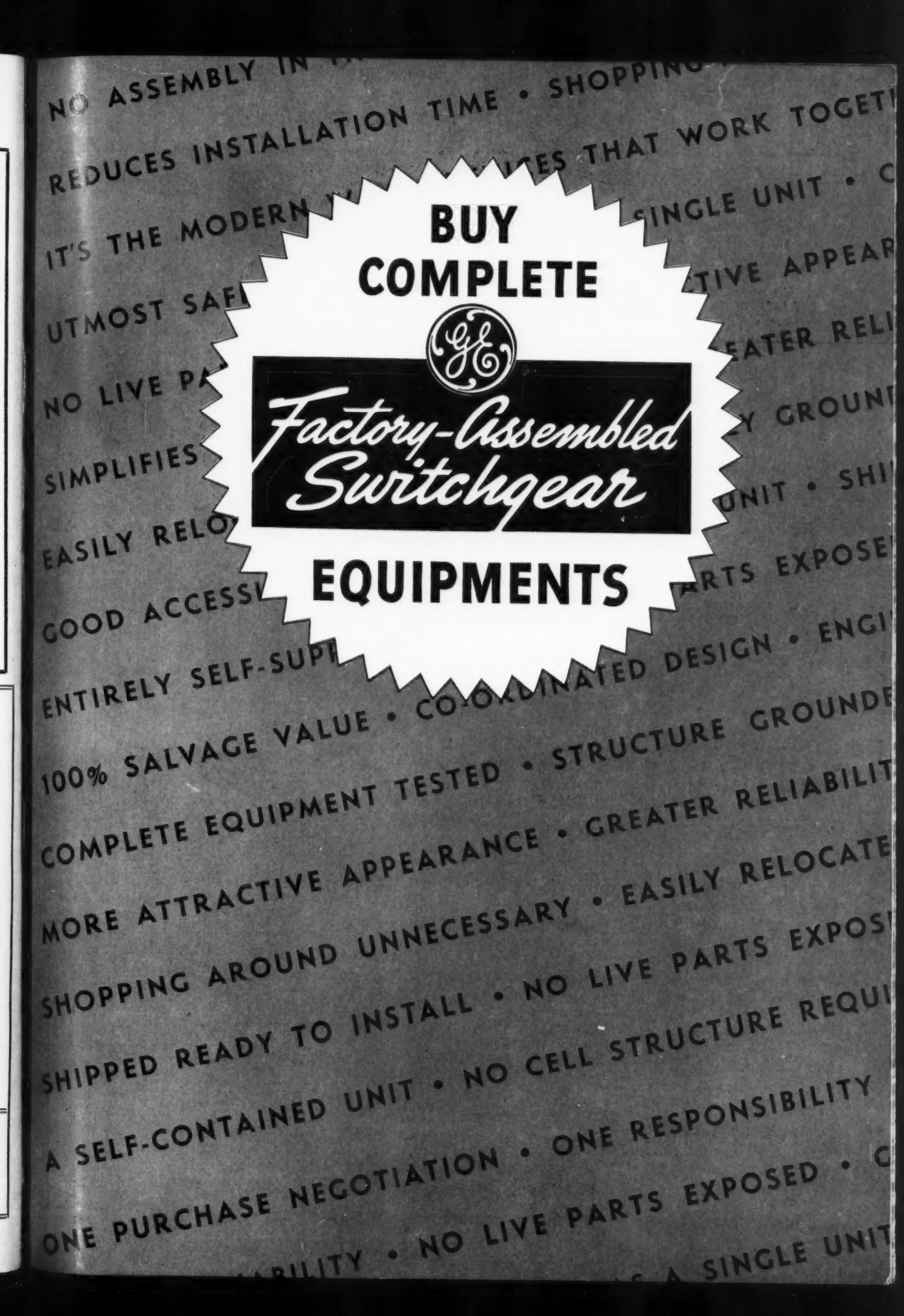
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COMPLETE
Factory-Assembled
Switchgear
EQUIPMENTS

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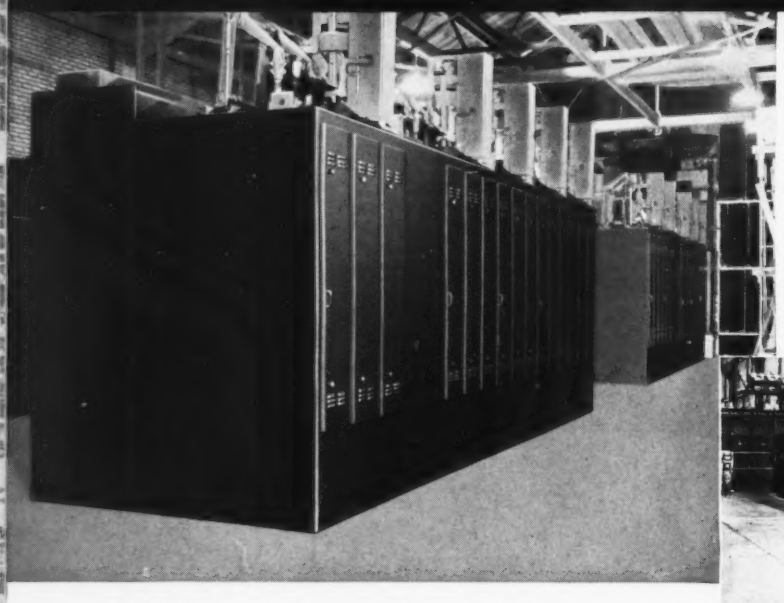
Present and Future



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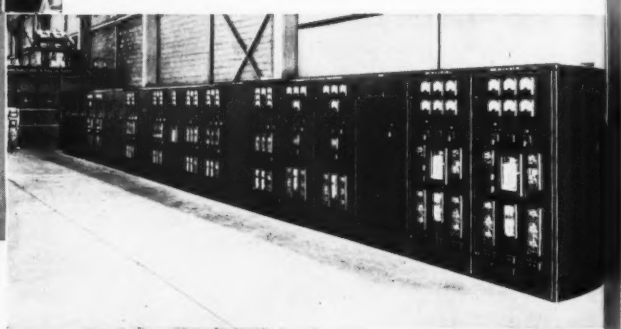
FH Cubicles — up to 34.5 kv, and 1,500,000 kva. This is the most advanced type of installation of the FH oil-blast breaker. Includes disconnecting switches, mechanical interlocks, buses, and necessary current transformers.

MI-6 Metal-clad Switchgear — up to 15,000 volts and 500,000 kva. Has the exclusive feature of easily removable breakers. Includes a stationary housing, mechanical interlocks, buses, and disconnecting devices.



SWITCHGEAR that is built and shipped as a unit is practically ready for operation the minute that it arrives at your door. You avoid expensive construction delays — the inevitable result of piecemeal buying — and you save on installation costs.

Even more important, you are assured of absolutely reliable operation, because a single responsible manufacturer has designed the whole equipment — a co-ordinated unit — all devices designed to work together.

Years ago, General Electric resources were put behind the development of metal-enclosed equipment — switchgear that could be shipped as a unit and installed as you do a motor. Today the trend is unmistakable. This is a NEW day in switchgear. Engineers are demanding metal-enclosed units. G-E designs are available for every switching job. General Electric Co., Schenectady, N. Y.

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Air-circuit-breaker Switchboards — for 600 volts up to 10,000 amperes. Draw-out-type breakers for easy and safe inspection.

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PAPER TRADE JOURNAL

THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY AND THE PIONEER PUBLICATION IN ITS FIELD

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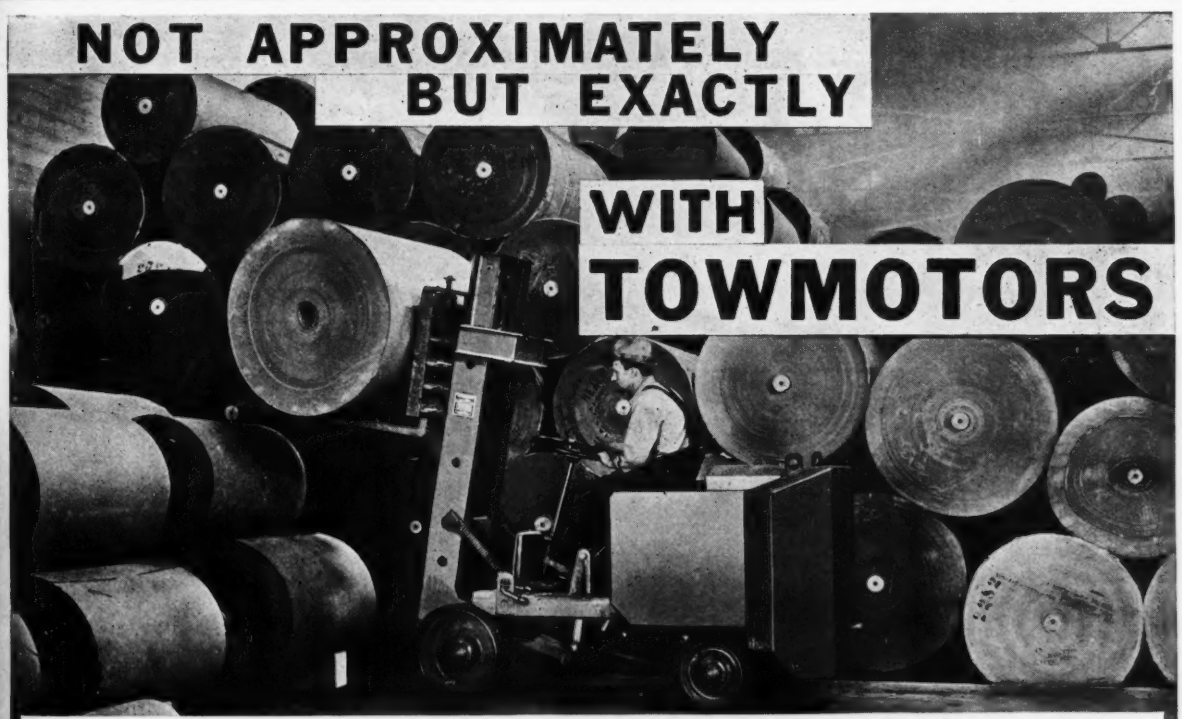

Handling paper in rolls or flat packages requires accuracy to effect real economy. Re-setting, re-handling or pushing does not lower costs. Smooth concentrated power under precise control for exact placing has built a good name for straight gas powered *Towmotor lift trucks* and saved money for their users. Perhaps *Towmotors* can save money for you, too.

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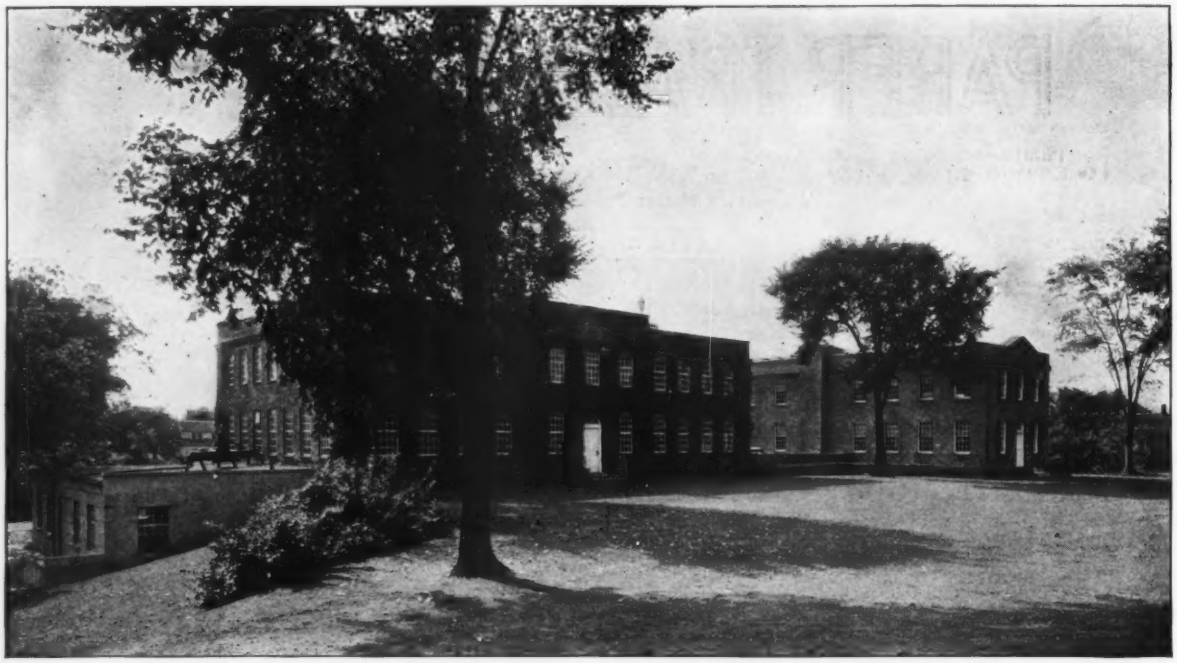

THE VANDERBILT LABORATORY, NORWALK, CONN.

In this laboratory we try to learn how our materials may be used to best advantage by our customers. Your cooperation is helpful and invited; you are welcome to visit our laboratory, discuss your problems, and to work on them there if you care to do so.

R. T. VANDERBILT CO., INC.

230 PARK AVENUE, NEW YORK, N. Y.

PAPER TRADE JOURNAL

Reg. U. S. Pat. Off.

SIXTY-SIXTH YEAR

PAPER

Established Feb. 17, 1899
Consolidated Nov. 16, 1899
with Paper Trade Journal.

Vol. CVI, No. 15 Thursday, April 14, 1938

PULP

Established Sept. 21, 1918
Consolidated Feb. 19, 1925
with Paper Trade Journal.

Asks Bids on 33,400,000 Pounds of Paper

Joint Congressional Printing Committee Will Receive Offers May 16 For Supplying The Government Printing Office With Paper For Six Months Period Beginning July 1 — Quantities and Varieties of Paper Wanted.

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., April 13, 1938—Bids are to be received on May 16 for paper for the use of the Government Printing Office for a six months period beginning July 1, the Joint Congressional Committee on Printing announced today following a meeting of the committee to receive the report of the paper specifications committee.

The bids will be for approximately 33,400,000 pounds of paper compared with 37,315,500 pounds for which bids were asked at the last opening. This is because Congress will not be in session during the latter six months of this year.

At the same time bids will be asked for envelopes for an annual supply. Bids will be received for 55,664,000 as compared with 47,527,000 envelopes used during the present year.

Quantities of Paper Asked For

Following are the quantities of paper asked for:

1,000,000 pounds newsprint paper.
3,999,000 pounds machine-finish book paper.
200,000 pounds antique book paper.
90,000 pounds lightweight machine-finish book paper.
186,000 pounds 50 per cent rag machine finish book paper.
15,000 pounds 75 per cent rag laid antique book paper.
15,000 pounds 100 per cent rag antique book paper.
2,100,000 pounds super calendered book paper.
520,000 pounds coated book paper.
30,000 pounds lithograph paper.
2,840,000 pounds mimeograph paper.
350,000 pounds U S M O safety writing paper.
6,000 pounds U S M O writing paper.
5,000 pounds safety writing paper.
4,702,500 pounds writing paper.
320,000 pounds map paper.
820,000 pounds manifold paper.
4,552,000 pounds bond paper.
791,000 pounds ledger paper.
640,000 pounds index paper.
2,000 pounds tissue paper.
285,000 pounds cover paper.
405,000 pounds manila paper.
435,000 pounds kraft paper.
1,500 pounds paraffin paper.
200,000 sheets gummed paper.
69,000 pounds blotting paper.
3,000 pounds stereotype molding paper.
20,000 pounds oiled manila tympan paper.
2,000 pounds plate-wiping paper.
2,000 pounds back-lining paper, for case making.
10,000 pounds high finish red sulphite.
90,000 pounds manila tag board.
1,100,000 pounds calendered tag board.
30,000 pounds manila cardboard.
140,000 sheets railroad board.
530,000 pounds bristol board.
6,000,000 pounds United States postal card bristol board.
19,000 sheets pressboard.
6,000 pounds news board.
810,000 pounds chip and strawboard.
15,000 pounds marble grained board.
36,000 pounds box board.
360,000 pounds binder's board.

In cases where more than 1,000 reams are called for, proposals will be received for 1,000 reams or more.

Envelopes Asked For

Following are the quantities of envelopes asked for:

42,745,000 Light-brown (Kraft Shade).
10,330,000 Writing, Sulphite, White and Colored.
255,000 100 per cent Rag Writing, White and colored.
320,000 Ledger, White.
1,695,000 Bond, 50 per cent Rag, White.
319,000 Bond, 100 per cent Rag, White.

Specifications Committee Report

The paper specifications committee made the following report to the Joint Committee on Printing.

The Committee on Paper Specifications respectfully submits its Thirty-fifth Report and the accompanying recommended schedule for paper for the public printing and binding and blank paper for the

(Continued on page 38)

Future Trend of Pulp Wood Market Uncertain

Shipments Less Heavy Than Usual As Pulp and Paper Mills Take Less Wood Than Contracted For—Member of Legislature Criticizes Lake Sulphite Management—Government Control of Forest Lands—Other News.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., April 11, 1938—Thompson-Heyland Lumber Limited, Toronto, who for many years has transacted an extensive business as shippers of pulpwood, reports that the outlook at present is somewhat uncertain owing to prevailing business conditions, and that shipments have, in late months, not been nearly as heavy as is usual at this season. This is accounted for by the fact that last spring many pulp and paper companies made large contracts but owing to the change in the market situation have not been taking all the wood that the contracts called for. To what extent the volume for 1938 will reach is a live issue and on this point the mills have not been able to come to any decision. Various plants, which in other years have placed their orders early for so many thousand cords, have been holding back, and it will be fully a month before commitments are made. It is believed that the price, which was advanced last year from 10 to 15 percent, will continue on the same basis. The whole situation is now somewhat involved, but with producers and consumers the hope is expressed that business in the pulpwood line will improve with each succeeding month.

Criticizes Lake Sulphite Management

Charles W. Cox, who is the Liberal member in the Ontario Legislature for Port Arthur, and is also mayor of that city, is an extensive dealer in pulpwood. Recently in the Legislature he criticized the operations of the Lake Sulphite Pulp Company Limited, which some time ago went into the hands of a receiver. He said that the undertaking stood as a monument to the most mismanaged enterprise in the history of Northern Ontario, and money had been spent as if "by drunken sailors." Mr. Cox claimed that the management was placed largely in the hands of men outside of Ontario, many of whom were wholly unfamiliar with the departments over which they were supposed to have control. He referred to the enterprise which planned to build a mill and townsite at Red Rock as "a fiasco." Mr. Cox stated that he would like to have an investigation into the matter of the Lake Sulphite Pulp Company's affairs, but that it should be extended to the Nipigon Corporation as part of the limits now owned by Lake Sulphite Co. were put through in a deal by a previous administration.

Government Control of Forest Lands

Hon. J. S. McDiarmid, Minister of Mines and Natural Resources, announced in the Manitoba Legislature that government control of all privately owned forest lands in the province was the goal of the Department of Mines and Natural Resources. Mr. McDiarmid stated that the value of Manitoba forest wealth was placed at $120,000,000, from which the annual revenue yielded the Crown $250,000. The forest area of the province covered 93,000 square miles, or about 55,000,000 acres, and was approximately four times the total area now devoted to crops and pasturing livestock. Fully 90 per cent of the forest land was already invested in the Crown, and the ideal sought by the Department of Natural Resources was public ownership of the entire forest area.

Hon. William Finlayson, Midland, Ont., former Minister of Lands & Forests for Ontario, recently criticized the provincial government policy of reallocating timber limits without advertising and without tender. He charged that this was akin to repudiation of agreements in which the limits had been allocated previously. Out of twelve pulpwood agreements involved in the erection of pulp and paper mills in Ontario, only one had gone ahead, and that was a lamentable failure.

Stauntons Ltd. To Expand

Stauntons, Limited, a subsidiary of Canadian Wallpaper Manufacturers, Limited, erected a modern, well equipped plant nearly a year ago at Leaside, a suburb of Toronto. So successful has been the business that expansion will shortly be undertaken, and a two story addition will be erected to the original structure. The extension will be of reinforced concrete with brick and tile walls and mastic floors. The present floor space has been found inadequate to accommodate the operations of the company. The original plant cost $400,000 and embodies many features of design, layout and equipment for industrial buildings.

First Newsprint Mill in Ontario

Dr. J. J. Talman, provincial archivist of Ontario, states that the first daily paper issued in Toronto was the Royal Standard which appeared on November 9, 1836, and was also the first daily sheet published in Canada. It was ahead of its time and lived only a few years. The newsprint was provided by James Crooks from the first paper mill in Ontario, which was located at West Flamboro.

Doon Twines Warehouse Destroyed

Fire recently gutted a warehouse of Doon Twines, Limited, at Kitchener, Ont. Half of the eight thousands bales of jute valued at twenty dollars per bale was damaged by fire or water, particularly the latter. Firemen virtually dismantled the building in their effort to stem the outbreak.

To Display Wolf Award Winners

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, April 11, 1938.—Prize winning packages which were recipients of the coveted Wolf Awards at the recent annual packaging show here will be displayed during April at Container Corporation of America's New York Display Room, Graybar Building, 420 Lexington Avenue, New York.

Established several years ago as the principal feature of the American Management Association's annual packaging conference, the awards are offered by Irwin D. Wolf, Pittsburgh manufacturer.

Here's one operation on which

YOU'RE SURE TO MAKE A PROFIT

Regardless of costs, prices and hours you stand to make a profit on your Bird Save-All every time you turn a wheel. Every Bird Save-All installation is figured to produce highest net return per gallon of white water . . . Why not let us work out the figures and show you how many dollars the Bird Save-All will deliver to you each week.

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BIRD SAVE-ALL

Wisconsin Labor Act Explained To Paper Men

Chairman of State Industrial Commission Addresses 60 Members From Pulp and Paper Mills—Labor Board To Consider Applications — Director Explains Functions Of Paper Institute—Other Late Industrial News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., April 11, 1938—An explanation of the purposes behind the Wisconsin Labor Relations Act was given in an address by Voyta Wrabetz, chairman of the Wisconsin Industrial Commission, Madison, Wis., to 60 members of the industrial relations group of personnel men of the pulp and paper mills of the Fox River Valley. The meeting was held in connection with a dinner at Hotel Northern at Appleton, Wis., April 5. R. W. Mahoney of the Appleton Coated Paper Company, served as toastmaster, and the arrangements were made by Charles Eubank of the Kimberly-Clark Corporation, Neenah, Wis., secretary of the group.

"Collective bargaining is a give-and-take proposition and if both the employer and employee lay all the cards on the table so each has confidence in the other's sincerity, an agreement can easily be worked out," Mr. Wrabetz said. He traced the history behind the state labor relations act, pointing out that the corporate state has given management the status of an absentee landlord as compared to the day of the small industry, and close contact.

Passage of the law forbidding the "yellow dog" contract by which a worker would agree not to join any labor organization if given employment was one of the first steps in combatting the injustices, the speaker said. This law was enacted in 1929, and was followed in 1931 by a statement of public policy adopted by the Wisconsin Legislature. The state labor relations act's purpose is to give life to the statement of policy, and prohibits employers from doing the things that had been done in the past to prohibit and interfere with the worker's right to organize and do collective bargaining.

Dwelling on the matter of company unions, Mr. Wrabetz said these independent unions must "persuade" or convince the labor relations board that they are not company unions and the burden of proof rests with them. More than 20 independent unions have already been listed and about the same number have been denied, he said. A round-table discussion followed the talk.

William F. Ashe, personnel director of the Thilmany Pulp and Paper Company, Kaukauna, Wis., spoke briefly of the new duties he will soon assume as the director of the new state department of commerce. He expects to leave his present work for the new position about May 1.

Labor Board To Consider Applications

A state labor board hearing will be held Wednesday, April 13, to consider the application for listing of an independent union of employees of the Appleton Coated Paper Company, Appleton, Wis., according to J. K. Kyle, secretary of the board. This union was denied listing previously, but the union officers are now applying on the basis of their recent bargaining negotiations with the company.

On Thursday, April 14, the board will consider the application of an independent union formed by the employees of the Kimberly-Clark Corporation's mill at Kimberly, Wis. The union is a separate unit for only this one mill of the Kimberly-Clark group.

Reforesting Plantings of Red and Jack Pine

Planting for reforestation will start earlier than usual this year, meaning the seeding of a larger acreage. Plantings will include 3,400,000 red pine seedlings, 1,400,000 Jack pine, 225,000 of white spruce and 100,000 of white pine. This work will be done in the Nicolet National Forest, largely by CCC crews.

Director Explains Functions of Paper Institute

The history, purposes and functions of the Institute of Paper Chemistry, Appleton, Wis., were explained by Westbrook Steele, executive director, in an address last week before the students of Lawrence College, with which the Institute is affiliated. Pointing out the small beginnings with a budget of $40,000, he said the Institute today has three new buildings, equipment valued at $800,000, and will spend more than $300,000 for operations this year. It had 19 paper mills as its backers when started in 1929, and today receives contributions from 65 firms, representing 170 pulp and paper mills, scattered all over the United States. Up to the current year, it has admitted only 15 students annually, but next fall will admit 17 from a group of 200 applicants.

Mr. Steele explained that the 1927 ruling by the department of labor that scientific brains could not be imported into the United States for commercial purposes except as "contract laborers and under bond" created a sudden demand for trained personnel in Almerican industry, and was one of the important factors in establishing the Institute. A visit to every institution professing to do anything in the way of training men for the paper industry revealed that in the whole United States less than $3,000 worth of books on pulp and paper, its chemistry and processes were collected in any one place. Today the Institute has one of the most complete reference libraries in the world.

Three-fold purposes are: Education of man power specifically for the paper industry at graduate level; establishment of a library with ultimate aim of gathering all available scientific literature pertaining to pulp and paper, and prosecution of scientific research in the fundamental problems of the pulp and paper industry. The proportion of openings available for graduates of the Institute has never been less than 7 to 1, Mr. Steele said.

Unemployment Compensation Law Helpful

With unemployment running high, Wisconsin's Unemployment Compensation Law is proving highly beneficial to workers who are laid off. The Wisconsin Industrial Commission reported a total of $1,149,066 paid in March to 42,000 workers. In February the payments totalled $1,160,641. The number has continued to drop off, however, during recent weeks.

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Paper and Cordage Association Holds Dinner

Large Attendance At Annual Shad Dinner of Philadelphia Association At Poor Richard's Club—N. A. Considine Awarded Cross of Knight Order By Finland in Recognition of Valuable Services—Other Late News.

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., April 11, 1938—The attendance at the annual shad dinner of the Philadelphia Paper & Cordage Association, Inc., held in the banquet room of Poor Richard Club on last Thursday evening, far exceeded the expectations of president, Joe Miller.

The inclement weather Philadedlphia experienced last week together with an epidemic of colds, it was thought would be a deterrent factor in the attendance, but as Chairman of the Entertainment Committee, E. K. Lay stated the number of reservations made by the members for their guests brought the attendance up to well over two hundred. During the dinner, Russell Thayer, formerly of Roxy's gang, acted as master of ceremonies, entertaining with singing of popular songs; he was assisted by Miss Billy Richman, singer and popular night club entertainer. President Miller was toastmaster, introducing a number of prominent members among whom were Sam Shryock, who injected a continental note in relating incidents of his South American air jaunt, and Jack Howarth who graphically described his experiences while exploring the air lanes of the west. George K. Hooper, former president of the Association, explained the principles of the Association to the new members and guests who were present, stressing the fact that these informal get-togethers have led to a tremendous amount of friendliness and good fellowship among the paper trade generally.

N. A. Considine Honored by Finland

Norbert A. Considine, president of The Paper House of Pennsylvania, and Consul for Finland was decorated by the Cross of Knight 1st Class of the Order of the White Rose of Finland by Minister Eero Jarnefelt, Finland's Diplomatic representative at Washington, at a luncheon in the Down Town Club at 1 P. M. on Friday, April 8th. Finland's Consul General at New York, K. F. Altio, the Commercial Attache of the Legation, Dr. Ilmari Waananen and representatives of the local Consular body together with Finnish organizations were also present. The decoration recently endowed by President Kallio of the Finnish Republic and Grand Master of the Order was conferred on Consul Considine, in recognition of the valuable services rendered to Finland by him as Finland's representative in Philadelphia since May, 1925.

Consul Considine is a native Philadelphian. He graduated from St. Joseph's College in 1913, and after completing his college course, he engaged in the paper business, and in 1918 established his own company, The Paper House of Pennsylvania. In 1919, during the acute post war paper shortage, he pioneered in the search for new sources of supply abroad for American publishers.

Finland, at that time, emerging from the havoc of her War for Independence with Red Russia, was in search of new markets for her paper mills. Consul Considine brought the first shipments of Finnish paper into Philadelphia, and this port soon became the most important in America for Finnish trade. During frequent visits to Finland he formed a wide acquaintance among industrialists of the new Republic. Consequently, when Finland proceeded with the establishment of her corps of Consular representatives in the United States of America, the choice for the post at Philadelphia fell to this city's resident best known in the country's foreign trade circles. His appointment was confirmed by Secretary of State Frank B. Kellogg in May, 1925.

In 1936, on the completion of the Reciprocal Trade Treaty between the U. S. A. and Finland, he was assigned the task of developing the American market for Finland's newest and fastest growing industry, plywood. Considine & Company of Philadelphia, of which he is president, is the representative of some of the leading plywood mills of Finland for the U. S. A.

In addition to Minister Eero Jarnfelt, Consul General K. F. Altio and Commercial Attaché Ilmari Waananen, those present at the luncheon at the Down Town Club included the father of the Consul, James P. Considine, retired former business manager of "The North American", which in its day was Philadelphia's leading daily newspaper; Consul General of Great Britain at Philadelphia, Frederic Watson, Consul Mathias Moe of Norway, Consul Maurice Hogeland of Sweden, Consul Ludwig Brehm of Denmark and Mr. Emil Hurja of Washington, D. C.

American Bag & Paper Employees Strike

About 100 men and women employes of the American Bag & Paper Company, Water and South streets, started a sit-down strike this past week. The strikers congregated on the second floor after reporting to work, and signalled arriving truck drivers not to unload. At lunch time they went out in groups. The strike was voted by the United Bag Workers and Allied Trades, Local 35, C.I.O. Charles Bridgewater, business agent, said the management refused a contract unless employes left the C.I.O. and formed an independent union. He said charges have been filed with the National Labor Relations Board.

All About Iron for Piping Systems

A. M. Byers Company, Pittsburgh, Pa., offers copies of "Wrought Iron for Piping Systems" without charge to those who request it. This well illustrated forty-page publication discusses pipe materials; costs; pipe selection; why some metals resist corrosion better than others; water supply, drainage, heating and power systems; and a section devoted to installation procedure. The bulletin contains forty pages, many of which are illustrated with piping installations.

A feature that should prove especially valuable is the appendix, containing statistical data regarding the life of various pipe materials in specific installations.

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Paper Industry In Chicago Area Improved

Demand For Many Grades of Paper Strengthens Midwest Market Which Except Substantial Uptrend in Sales—George Gibson in Cellulose Apparel —Economist Talks At Salesmen's Association Meeting.—Other Late News.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., April 11, 1938—The Easter business in the Chicago area took a decided backset at the hands of the weather this week as blizzards and cold rains cut down buying considerably. However, the paper industry gave a fairly good account of itself with buyers responding to the recent declines in the sulphite grades to indicate that the "bargain" prices may not last long. Underlying strength in the kraft market was further noted this week as buyers began to note the possibility of scarcity in raw materials. Demand was fair. Groundwoods had an uneventful week though local executives expressed a belief that a substantial upturn was in the not far distant future. Newsprints were little changed. Book paper buyers were a bit more plentiful and the tone of the book market was reported as better than last week. There is ample evidence that the antics of the stock market are not stopping certain basic upswings all along the line and paper merchants here continue to hold to the belief that a month or so more should show substantial betterment. Waste paper markets continue to be very unsatisfactory with a pronounced weakness in evidence in virtually all grades.

George Gibson in Cellulose Apparel

The Chicago paper industry was given quite a treat during the week with the appearance of George K. Gibson of the Mosinee Paper Mills Company, at the recent Salesmens Association luncheon outfitted entirely in wearing apparel made from cellulose products. The well known paper executive also "made" the daily press with his outfit which consisted of underwear, shirt, sox and suit made from a source of raw material heretofore thought to be the basic claim of the paper industry. Mr. Gibson explained the items of clothing he wore to members of the Association and stated that he adopted this method of approach to the question for the purpose of calling the attention of the paper industry to future shortages of pulp as more and more products were made from cellulose. Quoting facts and figures, Mr. Gibson pointed out that the industry should certainly get a fair market price now for products made from pulp what with the growing international tendency to take over this raw material for other than paper uses. It was stated that in Germany, where the wearing apparel was purchased, almost the entire German army is outfitted in clothes made from the cellulose product and that if forced to depend upon its own supply, the German nation would even now be about 7 per cent short in filling its present needs.

Economist Addresses Salesmen

The midwest division of the Salesmens Association of the Paper Industry is promised an interesting session on Monday, April 11, when Dr. A. P. Haake, managing director of the National Association of Furniture Manufacturers speak to the group on "One Glorious Mess". A dynamic speaker and an attendant and participant at the recent conference of Small Business Men in Washington, Dr. Haake is expected to give the salesmen quite an inside view of the business picture and of the relationship of the small business men's movement to trade associations existing today. Dr. Haake is a well known economist who has given a considerable amount of study to the business picture. To accommodate the expected large crowd, the Association has designated the meeting as open to guests and expect to fill the meeting room with around 200 members and guests.

Dwight Bros. Issue New Price List

Dwight Brothers Paper Company has recently issued new prices on all sulphite bond products sold by the Chicago concern. The new price list also includes the new "eye comfort" pale green item coming in the Atlantic Ledger line. Dwight reports that present sulphite prices are the lowest since 1916 and stress the "bargain" nature of the present listings.

Wolf Awards To Paper Industry

Wolf awards to members of the paper industry have recently been announced by the Management Association under whose auspices the recent eighth annual Packaging Conference in Chicago was held. The Robert Gair Company won awards for exhibits at the Palmer House showing the most effective use of the element of design to create safe visibility in retail selling and also an award for the most effective package for a product not previously packaged. A third award was also claimed for the most effective floor display. The Dixie-Vortex Company also won a Wolf award while the Container Corporation of American was honored for the most efficient shipping container for merchandising and construction ingenuity. The Container Corporation has reported that the prize winning packages which won the coveted Wolf awards are to be displayed during April at the Container Corporation of America's New York display room in the Graybar Building. Advertising agency men, art directors and others interested in packaging have been invited by the Container Corporation to visit the display.

Card on Proper Care of Hose

A large useful instruction card on the proper care of rubber hose is being distributed by The Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc., Passaicfi N. J. This card is designed to be hung in a conspicuous place wherever hose is stored or used. It gives valuable maintenance rules for unpacking, using and storing, observation of which is necessary for long and satisfatory hose service. Instructions are also given for attaching couplings and for the proper use of steam hose, including a table showing temperatures of saturated steam at various pressures. This card is 9 by 11 inches in size, attractive in appearance and provided with a strong eyelet for hanging.

Financial News of Pulp and Paper Industry

Union Bag's Sales and Earnings Well Maintained — Brown Co. Earns Profit—Quebec Pulp & Paper Reports Net Loss—Consolidated Earnings Higher—Champion Fibre Income Up—Oswego Falls Corp. Earnings Up.

NEW YORK STOCK EXCHANGE

High, Low and Last for the Week Ending April 13, 1938

	High	Low	Last
A. P. W.	2⅞	2⅛	2⅞
Armstrong Cork Co.	31	25⅝	25⅝
Celotex Corp.	20	17¾	18½
Celotex Corp., pf.	49¼	49¼	49¼
Certain-Teed Products Corp.	7	5⅝	6¾
Certain-Teed Products Corp., pf.	25¾	21¼	24¼
Champion Paper & Fibre Co.	23	19⅜	19¾
Champion Paper & Fibre Co., pf.	99	99	99
Congoleum-Nairn Co.	20¾	18	20⅛
Container Corp. of America	12⅞	11⅞	12
Continental-Diamond Fibre Co.	7½	6⅝	7
Crown-Zellerbach Co.	10	9	9⅝
Crown-Zellerbach Co., pf.	64	64	64
Flintkote Co.	16	12⅝	15
Robert Gair	3⅝	3	3⅜
Robert Gair, pf.	12¼	11½	12¼
International Paper & Power	6⅜	5	5⅞
International Paper & Power, pf.	25½	21½	24¼
Johns-Manville Corp.	69	61¼	67½
Johns-Manville Corp., pf.	123¾	122	123¼
Kimberly-Clark Corp.	21	20½	21
MacAndrews & Forbes	29	27	29
Masonite Corp.	31	28	30¾
Mead Corp.	10½	9⅛	9⅞
Paraffine Companies, Inc.	36	36	36
Paraffine Companies, Inc., pf.	92	92	92
Ruberoid Co.	18½	18	18
Scott Paper Co.	37	36	37
Sutherland Paper Co.	20½	20½	20½
Union Bag & Paper Corp.	11	8⅞	10⅛
United Paperboard Co.	4	3½	3⅞
U. S. Gypsum Co.	69½	57⅞	67
U. S. Gypsum Co., pf.	162½	162½	162½

NEW YORK CURB EXCHANGE

High, Low and Last for the Week Ending April 13, 1938

	High	Low	Last
American Box Board Co.	7½	7¼	7½
Brown Co., pf.	19½	16¼	19¼
Great Northern Paper	27	27	27
St. Regis Paper Co.	3	2¾	2⅞
Taggart Corp.	4	3½	4

Union Bag's Net Above 1937

With its bag business holding up in volume at the levels which prevailed in the like months of 1937, Union Bag and Paper Corporation for the first quarter of 1938 may show profits even greater than the $326,917 which it earned in the three months ended March 31, 1937, according to Alexander Calder, president. January and February profits and March billings indicate that the first quarter profit may run as high as $350,000.

"Such earnings would be approximately equal to the net of the final quarter of 1937," Mr. Calder said, "and would sustain the average quarterly earnings of 1937. Last year Union Bag earned $1,384,595, or an average of nearly $350,000 for each quarter.

"Union's bag sales in January and February this year were approximately equal to the corresponding months last year. March business ran ahead of February this year.

"Ability of Union Bag to sustain its profits is due to the fact that the company is now producing virtually all of the paper and pulp which it uses. Before construction of its large mill at Savannah, Ga., it had to purchase both pulp and paper. With kraft pulp selling at $47.50 a ton, there is a wide spread between the cost of purchased pulp and that manufactured by a company for its own use. At one time Union Bag had to purchase as much as 50,000 tons of pulp and from 30,000 to 40,000 tons of paper annually.

"Last November Union Bag completed the third unit of its mill at Savannah. In bringing operation of this unit into line with the other two a shut-down for six days in January was necessary. This reduced the profits of that month. In February, however, with all units operating, profits were considerably larger.

"Union Bag is now producing some kraft board which it sells to paper-board users, and is also selling some of its kraft paper output.

"With 1,045,735 shares of capital stock outstanding, prospective first quarter earnings of Union Bag would be equal to nearly 35 cents a share. In the first quarter of 1937 on one-fourth as many shares, Union Bag earned $1.25 a share. The stock was split-up four-for-one last summer.

"The advantage which Union Bag has obtained from the production of its own pulp is shown by the fact that in 1936 earnings were only $387,391, or less than one-third the total for 1937, and in 1935 net profit amounted to only $223,459," Mr. Calder concluded.

Brown Co. Earns $44,249

PORTLAND, Me., April 11, 1938.—The Brown Company, $44,000,000 pulp and paper concern operating under trusteeship, filed a report in federal court here last week showing a $1,773,953 business improvement for its 1937 operations compared with the previous year.

The corporation has been operating since 1934 under the federal bankruptcy act.

Leonard A. Pierce, counsel for three trustees, reported the company's consolidated operations for the fiscal year ending November 27, 1937, resulted in a $44,249 net profit, compared with a net loss of $1,729,704 for 1936.

The report declared the "future outlook at this time is too much obscured by the confused conditions, both domestic and foreign, to be evaluated with any degree of certainty." However, it noted "a slow improvement in orders."

Quebec Pulp & Paper Reports Loss

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., April 11, 1938.—The Quebec Pulp and Paper Corporation's financial statement for 1937 shows a net loss before depreciation of $238,355, as compared with a net loss for 1936 of $210,471.

The company's mills remained inoperative during the year, and, in presenting the report to shareholders, President A. Stewart McNichols states that the slump in the pulp and paper industry in the second part of the year interfered with an early solution of the company's problems. He adds that the directors will continue to explore every avenue that might lead to some amelioration of the present po-

A FAMILIAR SIGHT ON THE RAILROAD SIDINGS OF THE LEADING PAPER MANUFACTURERS

Those clean, aluminum-painted tank cars bearing the Diamond symbol you see on the railroad sidings of numerous prominent paper mills throughout the country are the visible evidence of a far-flung Liquid Chlorine Service that knows no geographical boundaries.

These paper manufacturers know from actual experience that Diamond meets every requirement for purity, for full strength and for dependability of supply the year around. Let Diamond serve you!

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sition of the company's shareholders and to an improvement in the labor situation ata Chicoutimi.

The balance sheet shows an increase in working capital deficit, current assets of $545,371 being down from $592,018 on the 1936 balance sheet and current liabilities being up at $1,149,914 from $973,983. Excess of current liabilities over current assets on the 1937 balance sheet is $604,543 as compared with $381,965 at the end of 1936. Among the current assets Government and Government guaranteed bonds are shown down at $530,000 from $575,000, while among current liabilities reserve for claims by Province of Quebec is up $1,097,178 from $940,919. Balance sheet deficit shows an increase of $238,355 at $4,064,838.

Consolidated Earnings Higher

[FROM OUR REGULAR CORRESPONDENT]

WISCONSIN RAPIDS, Wis., April 11, 1938.—A much improved earning position was shown by the Consolidated Water Power and Paper Company during the year 1937, according to the annual report to stockholders. The net income was $700,053, and is in contrast to a deficit of $114,914 in 1936.

Manufacturing profits and other income totalled $1,527,087, against $600,903 in 1936. Operating profit for 1937 was $920,155, compared with $12,-478 in 1936. The report shows a surplus for the year of $356,717 against a deficit in 1936 of $389,-940.

Champion Fibre Increases Profits

[FROM OUR REGULAR CORRESPONDENT]

CINNCINATI, Ohio, April 13, 1938.—Champion Paper and Fibre Company reports net profit of $1,-606,485 for the 40-week period ended January 30, compared with $1,255,094 in the like period ended January 31, 1937.

Earnings, which are after depreciation and Federal income taxes but before provision for undistributed profits surtax, are equal to $2.27 a share on 551,000 common shares, after preferred dividends, compared with $1.63 a share in the comparable period last year.

Oswego Falls Corp. Increases Earnings

[FROM OUR REGULAR CORRESPONDENT]

OSWEGO, N. Y., April 11, 1938.—The Oswego Falls Paper Corporation, manufacturers of bottle caps and paperboard containers, reports that all lines showed increased sales during 1937 and the net earned income was $314,993 after all charges, including surtax and undistributed profits tax. The plant was unable to produce all the paper required in the conversion plants, resulting in expenditure of $398,000 in December to increase the paper mill production.

Noble & Wood Elects Directors

[FROM OUR REGULAR CORRESPONDENT]

HOOSICK FALLS, N. Y., April 11, 1938.—At the annual meeting of the Noble & Wood Machine Company held recently the following directors were elected: Harry N. Weir, Clarence W. Noble, Clayton E. Shaw, Frank L. Stevens, Henry S. Lapan, Charles L. Whipple and Henry F. Cramer.

Pliofilm for Packaging

Introduction of Pliofilm to the packaging field is only in its infancy, yet the possible practical applications appear to be almost limitless. The packaging industry is rapidly developing these uses and adapting them to its particular needs. Progress is being made almost daily as new angles of thought and experience are focused on the remarkable characteristics of this new transparent sheeting.

Pliofilm is the registered trademark identifying the pliable transparent sheet manufactured with a hydrochloride of rubber base by The Goodyear Tire and Rubber Company, of Akron, Ohio.

Because Pliofilm is basically a rubber derivative it is waterproof and its dense molecular structure makes it practically impervious to water vapor. Unlike most transparent sheetings, Pliofilm is inherently moistureproof in itself and does not depend for this essential characteristic upon a minutely thin protective coating. As a result, normal handling and converting operations such as folding, creasing, laminating, printing and heat sealing do not impair its effectiveness as a barrier to moisture.

Pliofilm has no inherent moisture content and therefore does not dry out and shrink, nor does it absorb moisture and expand; in other words, its dimensional stability is excellent. It is also thermoplastic in its nature and can be sealed or molded by heat, or with a special solvent cement which has been developed for the purpose.

It is being used in direct contact with food items such as coffee, cheese, peanut butter, candy, etc.

In order to serve a variety of purposes, it is presently produced in five standard thicknesses ranging from one-thousandth of an inch (.001) to two and one-half thousandths of an inch (.0025), and in several different qualities depending on the amount and type of plasticizer used. In addition to the crystal clear, it is also produced in a wide variety of colors, transparent, opaque and metallic, that give unusually beautiful effects.

In spite of its dense structure, Pliofilm is unusually light and affords an exceptionally large surface area or yield per pound; for example, in the 100 ga. (.001") the area is 25,000 square inches per pound of material.

Pliofilm is furnished in either cut-to-size sheets or rolls. Sheets are sold on an area basis and rolls on a pound basis. Rolls are put up on standard core of three inch I.D. and are wound to a maximum overall diameter of nine inches. Full rolls weigh approximately two pounds per inch of width. Rolls can be furnished up to 45 inches in width.

Files Suit Against Container Corp.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., April 11 1938—Alvin E. Sandroft, president of the Thomas Paper Stock Company, has filed in the Circuit court a suit for $1,500,000 damages against the Container Corporation of America and three subsidiaries.

Sandroft said his company's business in waste paper was being jeopardized by the corporation's activities.

He claimed the defendants controlled 90 per cent of the waste paper market here and were trying to shoulder him out.

Southern Superintendents Reorganize at Jacksonville

JACKSONVILLE, Fla., April 11, 1938—The Southern Division of the American Pulp and Paper Mills Superintendents Association was reorganized here at an enthusiastic meeting on Friday of last week. The new association is headed by D. C. Metcalfe, of the Brown Paper Mill Company of Monroe, La., as chairman; Fred E. Augustine, of the Gaylord Container Corporation of Bogalusa, La., is vice-chairman; L. M. Chempayne of the Gulf States Paper Corporation of Tuscaloosa, Ala., is second vice-chairman; A. J. Mavarre of the Port St. Joe Paper Corporation, Port St. Joe, Fla., is secretary and treasurer.

B. D. Millidge, of the Howard Smith Paper Company, Cornwall, Ont., president of the American Pulp and Paper Mills Superintendents Association, presided at the meeting and urged the delegates present to lend as much cooperation as possible to the new association as it would benefit both them and the industry.

Dr. Herty Speaks

Dr. Charles H. Herty, of Savannah, Ga., who has done so much to publicise the pulp and paper making advantages of the South, speaking at the meeting declared that in the past few years, millions of dollars have been expended for mill construction to make kraft pulp and paper from Southern pine.

He predicted that in the near future, a greater expansion will be seen throughout the Southland, and he described the expansion program as not only benefiting the South by creating jobs and a new cash crop for the Southern farmer who supplies much of the pulpwood used by the mills, but that Southern kraft also is raising freight loadings on American railroads and shops.

New construction is putting thousands to work, he said, in the building and supplies trades. The whole country is benefiting from the use of kraft paper for bags, wrapping paper, packages and lightweight shipping cartons. Dr. Herty's great popularity was evidenced by the prolonged applause which followed his remarks.

Round Table Discussion

A feature of the afternoon session was a technical round table discussion of pulp and paper mill problems under the direction of William H. Brydges of the Bedford Pulp and Paper Company of Big Island, Va., a past president of the national association.

The discussion followed the delivery of two technical papers by John Noble of Nashua, N. H., a representative of the Improved Machinery Corporation, who spoke on "Kraft Screen Room Operations."

President Millidge, in the absence of C. D. DeMers of Rochester, N. Y., a representative of the Taylor Instrument Company, read a paper on "Cooking Control." Mr. DeMers, unable to attend the meeting, sent this paper to President Millidge.

Wives of a number of the delegates attended the meeting, and during the afternoon they were entertained at bridge and with a sightseeing tour of the city.

A dance followed the banquet.

Officials of the Container Corporation of America's mill at Fernandina, the Fernandina Pulp and Paper Company, and the National Container Corporation, attended the banquet. Early Saturday the delegates and their guests went to Brunswick, where they inspected the new mill of the Brunswick Pulp and Paper Company and the plant of the Hercules Powder Company.

Hercules Powder Co. Entertains

They were entertained at a luncheon at the Sea Island Yacht Club as the guests of the Hercules Powder Company, and at a banquet given by the Brunswick Pulp and Paper Company. C. H. Kent was among the hosts during the visit of the delegates to the Hercules plant.

Harry Newton Clarke of Cleveland, a counsel on industrial morale and personnel problems, was the speaker at the banquet.

The 1939 meeting, it was intimated, would probably be held in Monroe, La., although no decision on the matter will be made until later.

National Paper Box Men Meet

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., April 11, 1938.—With two officers of the National Paper Box Manufacturers Association, Allen K. Schleicher and William R. Kreeger, president and secretary, respectively, among the speakers, the annual convention and banquet of the New England Paper Box Manufacturers Association was held at the Hotel Statler March 31, approximately 120 attending the business session and 150 the banquet. President John R. Wrigley was in the chair.

Augustus C. Wiswall of the Consolidated Paper Box Company, Somerville, Mass., was elected president. Other officers elected were A. A. Weller, The Mason Box Company, Attleboro Falls, Mass., vice-president, and Thomas Casey Greene, Providence, R. I., secretary-treasurer. Board of directors, Albert Carpenter, A. H. Babcock Company, Attleboro, Mass.; Archer H. Fownes, Fownes Manufacturing Company, Rochester, N. H.; Lester Friend, Friend Box Company, Danvers, Mass.; Dana C. Huntington, Dennison Manufacturing Company, Framingham, Mass.; Harry Haskell, Clogston, Haskell, Michael's Corporation, New Haven, Conn.; Maurice B. Ullman, The Strouse, Adler Company, New Haven, and C. Howard Wilkins, Wilkins Paper Box Company, Inc., Boston.

Charles Morrison, of the Robert Gair Company, "dean of salesmen," was elected liaison officer, representing the supply houses, at a meeting of the Supply Dealers, held just before the convention was called to order.

The Cobb Test for Greaseproof Paper*

By R. M. Cobb[1]

Abstract

The Cobb Test is presented for consideration as a possible method for determining grease resistance.

Since it did away with uncertainty of endpoint, four of the 1936 Committee samples were readily graded through this methods by a worker who had never seen a greaseproof paper before.

The gain in weight of good greaseproof samples in an overnight test is of the order of gain in vapor-resistance tests; the gain is so small that rigid humidity control is essential if the quantitative results are to signify anything, and the use of blanks is advisable.

The gain in weight may be supplemented or even replaced by a qualitative observation. With this 16 hour test a series of papers may be readily graded by inspection of the penetrating greasy stains, possibly even better by comparison with stained quantitative standards.

Introduction

The Delaware Section has asked me to describe our application of the so-called Cobb sizing test and tester to greaseproof paper. The test is so simple that it will be necessary to go back into the history of greaseproof testing in order to complicate the subject sufficiently to make it interesting.

The first recorded lament on the subject of greaseproof testing occurs in the opening sentence of No. 4 Research Bulletin of the National Association of Folding Box Manufacturers, (June 1925). There it is stated that, "The present state of our knowledge of the grease-resistant properties of boards and papers is very meager and so incomplete as to give us no solution to the important problem of whether paper is adaptable for adequately packaging products containing grease or oils."

For 11 years paper chemists have sought to still this sad cry by creating a standard test method for greaseproof paper. And yet, in the last committee publication, December 24, 1936, we find Mr. Carson saying anent the Committee method tried,—"Although the method seems to be an improvement over previous efforts, the degree of agreement shown in the cooperative tests is not such as to allow one to get much excited about the method . . . although the table shows a fair degree of agreement in the order of rating, there is certainly not a unanimous opinion as to the best paper, or the next best, or the third and fourth choice. All seem to agree on the 3 poorest. It seems to me that a method that cannot unequivocally determine the relative rating of seven samples as widely different as those tested has not much to recommend it.

"For an official standard . . . we ought to wait until some method is available that could at least be depended on to rate unequivocally a series of greaseproof papers differing as widely as the seven reported on."

Now when Mr. Carson's statement was published by Mr. Mellen, some people recalled that back in 1934 a paper chemist had given a paper on a sizing test that had been adaptable to either water or oil, complete with sizing theory. They pointed out that the so-called Cobb test might be the maiden's answer to Dr. Carson's prayer.

Mr. Mellen kindly sent samples of all of his greaseproof specimens that he could find, four in all, and I tested them by this method. I tested these samples so carefully that now I am a member of the greaseproof committee. And the following notice has been sent out by Mr. Mellen, chairman of the grease resistance sub-committee:—

TO MEMBERS OF THE GREASE RESISTANCE SUB-COMMITTEE:—

"Enclosed is the method for applying the Cobb test for grease resistance. The apparatus mentioned may be purchased from W and L. E. Gurley, Troy, N. Y., for $7.50. The ring of 25 sq. cm. should be used in this test. The Neoprene gasket is obtained from Gurley, or from the Dupont Company, Fabrikoid Division, and should be carbon free.

"Four samples of grease resistant paper will be sent you under separate cover for the cooperative tests in which you have indicated that you would participate.

"I suggest that we use turpentine (commercial grade, dehydrated in the usual way) as the test liquid and that we make six tests on each sample of paper.

"Your prompt attention to this matter is requested. If possible, I wish to have the results ready for the TAPPI annual meeting.

HENRY L. MELLEN, CHAIRMAN."

Cobb Test for Grease Resistance

SAMPLES

"Samples are cut 6 inches square, representative and free from noticeable blemish. They are carefully conditioned at 65 per cent relative humidity and 70 deg. F.

APPARATUS

"Any method for applying the liquid under restraint may be employed. The Cobb tester is described by Egy in the Pulp and Paper Magazine of Canada for June, 1937.

"An essential additional feature is a Neoprene gasket. This consists of a 6 inch square of 1/16 inch thick Neoprene, with a hole in the center. The diameter of the hole should be identical with the inside diameter of the metal ring.

"The sample of paper under test is bostitched to a 5 inch square of blotting paper which has also been carefully conditioned. The two are weighed together. It is well to use, beneath them, on the base of the tester, a rubber mat covered by a piece of greaseproof paper board so that poor samples will not spoil the rubber mat. The sample to be tested is on top of the greaseproof paper board, thus making it the third layer from the bottom.

"The Neoprene gasket is next placed in the sample

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* Presented at the meeting of the Delaware Valley Section of the Technical Association of the Pulp and Paper Industry, Engineers Club, Philadelphia, Pa., Nov. 19, 1937.

[1] Research chemist, Lowe Paper Co., Ridgefield, N. J.

and the metal ring carefully centered over the hole in the gasket. Then the clamp is applied making everything tight.

"As it has been shown that the penetration of oil varies inversely as the square root of its viscosity, the thinnest oil will penetrate fastest. Therefore, Kerosene or turpentine should be used to give an accelerated test.

TIME OF TEST

"A good differentiation between samples may be obtained in 16 hours. This is a convenient time of test, since the test liquid may be poured on at 5:00 P. M. and removed at 9:00 the next morning.

METHOD OF REMOVAL

"The test liquid is poured off, taking care not to spill any off the ring. The clamp is swung out of position, and the sample pretty well mopped up before the ring is removed. Then removing the ring, the mopping up is finished, taking care not to get the oil on the absorbent paper. The sample is examined in a horizontal position on a level with the eyes to make sure that no shiny spots of solvent remain.

REPORT

"After wiping, the sample and blotting paper are weighed immediately to the nearest 0.005 and the results reported on gain in weight per 100 square centimeters. This may be accompanied by visual observation of leakage. Since the gains in weight are very small for good samples, it may be necessary to supplement the weight report by a description of the condition, such as penetration over the circumference of the ring, one or two tiny spots, etc. Rating by visual comparison with a set of stained quantitative standards may prove of value.

"Very good greaseproof paper will gain no more than .002 to 0.01 grams in 16 hours. This calls for very good humidity control and it is advisable to make the cooperative tests on dry days when it is possible to condition to 65 per cent r. h. The gain in weight is of the order of moisture loss in moisture proof tests.

DIFFERENCES IN TESTS

The course of all oils through greaseproof paper we believe to follow the now famous equation

$$l = \frac{r \sigma \cos \Theta t}{2 \mu} \qquad (1)$$

l = depth of liquid penetration in cm.
r = paper pore radius in cm.
σ = surface tension of liquid in dynes/cm.
Cos Θ = cosine of angle Θ taken by liquid in contact with solid.
t = time of penetration in secs.
μ = coefficient of viscosity in poises. μ Water = .01006 poise at 20 deg. C.

The Cobb test is always made for definite times. At the end of definite periods the amount of penetration is determined by weighing and by observation. The end point is definite.

The committee test, in contrast, used the moment of complete penetration for an end point. The time it takes for penetration indicates how good the sample is. The chief drawback is, as the boys say, a tendency to run slightly amuck while waiting for the sample to show recognizable penetration. The endpoint is not definite, and agreement on penetration time between observers is poor.

Rating the four papers sent in 1936 to Mr. Mellen by Dr. Carson's composite table:—(The Cobb test was made by a worker who had never tested greaseproof before).

	Order of Rating—Committee Method						
Observer	G_1	V_{II}	V_{II}	B_2	VB_1	V_{II}	S_2
Carson	1	2	3	4	5	6	7
Dufford	1	2	4	3	5	6	7
Wehmer	2	3	1	4	5	6	7
Hammerlund	2	1	3	4	5	6	7
McKinley	1	2	3	4	5	6	7
Hoffman	1	2	4	3	5	6	7
Mellen	2	1	3	4	5	6	7
Total	10	13	21	26	35	42	49
Composite Reading	1	2	3	4	5	6	7
	Order of Rating—Cobb Test						
	0	..	..	.01	.07	..	1.50

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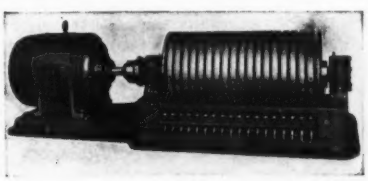
High Speed Hammer Crusher

A machine to reduce to the proper size the rejects from the chip screen, especially those that do not pass through the openings of the screen, has recently been developed by D. J. Murray Manufacturing Company, Wausau, Wis., and designated as Murray High Speed Hammer Crusher. As its name implies, this crusher operates with a series of swinging hammers attached to the rotor shown in the illustration here, and another series of fixed "fingers" between which the projecting ends of the swinging hammers pass as they revolve. In operation the rejects are caught between the under side of the swinging hammers and the top side of the "fingers" and thus crushed. This high-speed hammer crusher is made in 3 standard sizes, 24, 36, 48 inch, and designed to operate at high speed from 1,000 to 1,400 r.p.m. with an approximate capacity of 75 cords to 150 cords for 10 hours, depending upon conditions. This crusher is heavily constructed and the rotor casing is made in one piece, a rigid design to withstand vibration.



Oil-Proof Transmission Belt Perfected

Paranite-G. O. P. Transmission Belting, recently perfected by The Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc., Passaic, N. J., solves a serious machine shop problem. One of the greatest disadvantages, it is said, in the use of rubber belting has been the destructive action of mineral oil on rubber friction compounds. Because of this, rubber belting has been looked upon with suspicion by machine shop operators.

To meet this condition, after a long period of research and the experimental use of many belts in the field, Manhattan has developed the Paranite-G. O. P. (Gas and Oil Proof) Belts. There is no natural rubber in these belts, the friction compounds being of recently perfected G. O. P. synthetic material, which may be used and compounded as is rubber. Oil accumulating on the belt, as is common in machine shops, in automobile manufacturing plants, and in other factories, will not cause swelling or deterioration. Paranite-G. O. P. Transmission Belting is made in regular transmission belt sizes.

A Study of the Oil Penetration Rate of Paper*

By Gerard A. Albert[1]

Abstract

For determining the oil penetration rate of absorbent papers such as are used in the laminated phenolic industry, two different types of penetrometers have come into use, namely, the Williams penetrometer and the Westinghouse cup. The results obtained with these two instruments are not the same; the Williams penetrometer yields consistently higher values than those obtained with the cup type. The cause of this difference was investigated and was found to be due to the fact that the instruments tested different areas of the specimen. When the results obtained by testing equal areas of specimen were properly compared, both instruments yielded identical results.

Introduction

A very important test to determine if an absorbent paper is suitable to be impregnated with various liquids such as melted waxes, oils, or phenolic resin varnishes, is the castor oil penetration test. The value of this test is selecting paper for use in making laminated phenolic materials has previously been shown *(1)*. To make this test two types of apparatus have come into use One is the Williams penetrometer *(2)* and the other the Westinghouse cup. *(3)*. Even though the design of these two instruments is quite different from each other, their principle of operation is the same. With both instruments the time in seconds for complete penetration of the paper specimen is taken as the criterion of the penetration rate of the paper.

The results obtained with the Williams type penetrometer are found to be consistently higher than those obtained with the Westinghouse cup penetrometer. The work reported in this paper was undertaken to determine the cause of the difference in the results obtained with these two type penetrometers.

* Presented to Sub. Comm. VIII—Insulating Papers and Fabrics, Comm. D-9, A.S.T.M.

[1] Engineer, the National Vulcanized Fibre Co., Phenolite Div., Wilmington, Del. Member TAPPI.

The Penetrometers

The Westinghouse cup penetrometer consists of but two parts, an upper saucerlike portion and a base into which it is screwed. Both parts have a 5/8-inch diameter hole in their center which is in alignment when assembled. For ease in viewing the underside of the cup, while making the tests, it is placed on a stand with a mirror mounted under it. The penetrometer with stand and mirror is shown in Fig. 1.

FIG. 1.

The paper specimen to be tested is placed in the inside of the lower portion of the penetrometer over the 5/8-inch hole and is held firmly by screwing on the upper portion, thus exposing both sides of the paper at the hole. The test procedure consists merely of pouring oil into the cup-shaped upper portion of the penetrometer and recording the time in seconds from the first contact of oil with the specimen until the under side of the paper is completely penetrated. The time in seconds checked with a stop watch is taken as the criterion of the penetration rate of the paper.

The Williams penetrometer illustrated in Figs. 2A. and 2B. is a more elaborate instrument than the cup type but its fundamental principle of operation is the same. Essentially, it consists of a cup of 2½ inches inside diameter and about ¾-inch deep which holds the oil saturant. The paper specimen under test is clamped to the top of this cup with a metal ring. When the paper specimen is attached to the top of this cup it is rapidly turned upside down so as to make the oil come in contact with the paper specimen. Since the inside diameter of cup and

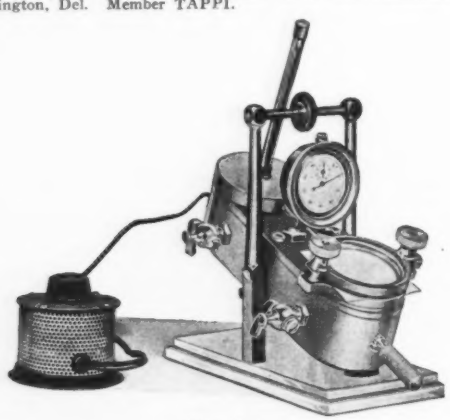


FIG. 2A.
Williams Penetrometer (Showing position for inserting sample)

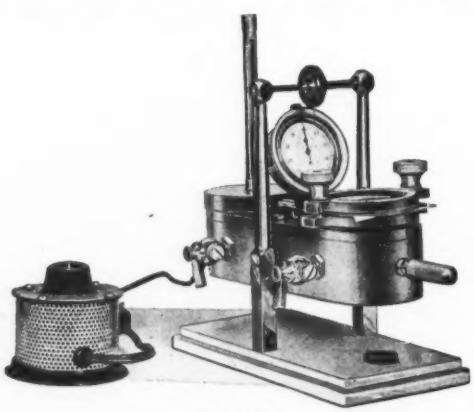


FIG. 2B.
Williams Penetrometer (Showing position during the progress of the test).

clamping ring is 2½ inches in diameter a paper specimen of 4.90 square inches is tested. The time to completely penetrate the paper is recorded from the first contact of oil with the paper specimen until its under side is completely penetrated. A cam arrangement automatically starts a stop watch when the cup is inverted.

Procedure and Results

The papers used in making the comparative oil penetration tests with the two type penetrometers were absorbent papers covering a rather wide range of oil penetration rates.

All paper specimens were so placed in the penetrometers that the oil came in contact with the felt side of the paper first and penetrated through to the wire side. The saturant used was castor oil having a viscosity at 25.0 deg. C. of 6.35 poises. It was cold pressed grade AA obtained from the Baker Castor Oil Co. All measurements were made with the room temperature carefully maintained at 25.0 ± .2 deg. C.

TABLE I.

Comparative Oil Penetration Rate Values in Second of Various Papers Using a Williams Penetrometer and a Westinghouse Cup Penetrometer.

	Penetrometer Type	
	Westinghouse Cup Orifice	Williams Orifice
Paper No.	⅝"-Diam.	2½"-Diam.
A	14.7	18.5
B	21.0	25.5
C	23.8	27.7
D	69.2	83.1

In Table I are listed some comparative results of tests made on four papers using the two type penetrometers, the Williams and the Westinghouse cup. These data which are the average of ten tests illustrate that the two types of penetrometers yield different results for the same grade of paper.

The main difference between these two type instruments was the size of the orifice and hence the area of the paper tested. The effect of orifice size on the penetration rate of paper was investigated by making tests with three cup penetrometers, all identical except for the size of their orifices. The sizes of the orifice holes were ⅜, ¾ and 1⅛ inches in diameter. The latter size was found to be the largest into which oil could be poured without an appreciable time lag for the oil to spread over the entire surface of the paper specimen. Comparative penetration tests made on four papers using the three cups of different size orifices are shown in Table II. The listed values are again each an average of ten tests.

TABLE II

Oil Penetration Values in Seconds of Various Papers Using Cup Penetrometers of ⅜ inch, ¾ inch and 1⅛ inch Diameter Orifices.

	Diameter of Orifice (Inches)		
Paper	⅜	¾	1⅛
A	13.8	15.5	16.1
B	19.6	21.5	21.7
C	22.7	24.8	25.3
D	68.0	70.3	75.4

These results show quite conclusively that the time of complete oil penetration is effected by the size of the orifice in the cup penetrometer; the larger the orifice the longer the time necessary. The cause for this difference in time using cup penetrometers of different size orifices was attributed to the nonuniformity of the paper. The presence of slow spots in the specimen under test will naturally alter the oil penetration rate of the specimen because it is the time necessary to penetrate the slowest spots in the specimen that is noted.

Since paper is composed of a web of nonuniformly distributed fibers, it will contain clots of fibers of varying sizes, which will, of course, require different times for the oil to penetrate them. It is quite probable that specimens of large area will contain some of these clots or slow spots, whereas specimens of smaller area may not contain any. If then, the average value of a number of penetration tests, made on small specimens, is compared to the average value of an equal number of tests made on larger specimens, the values will, of course, not be the same. The results obtained from testing the large areas will be higher than those obtained by penetrating the smaller areas.

Consider an area of paper as being divided into six equal parts as shown in Fig. 3A. If each of these six small areas were penetrated, the time of penetration would be found to vary from place to place

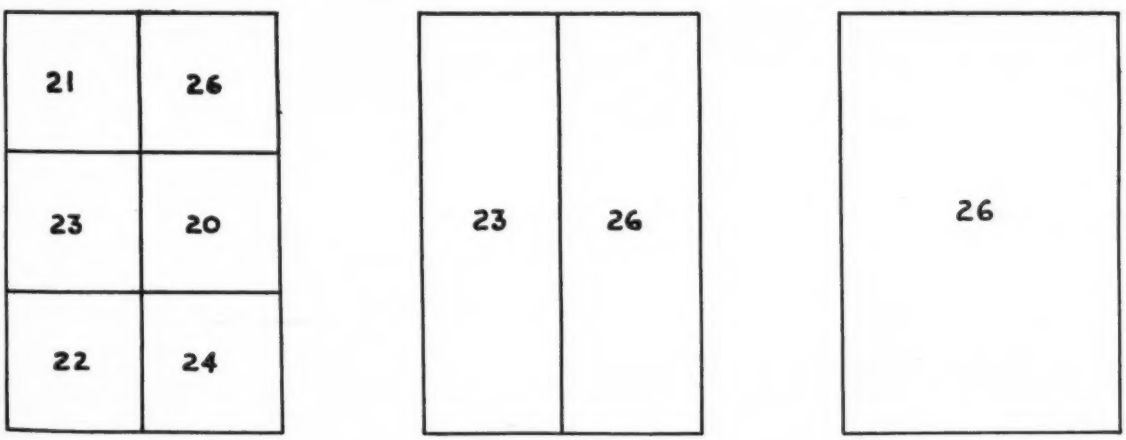


FIG. 3.

due to the presence of fiber clots in the paper. For illustration, the seconds required to penetrate these six areas are shown by the numbers written in each small area. If this same area of paper were tested by a penetrometer large enough to test one-half of it at a time, the test results would have been as shown in Fig. 3B. Further, if this same paper specimen were tested in a penetrometer whose orifice is the same size as the paper specimen, the results would be as shown in Fig. 3C. It is to be noticed that the slowest spot in each area tested determines the time for completely penetrating that area.

This illustration shows that if the results of tests made with penetrometers of different size orifices are to be compared, the total area of specimen should be tested with each instrument. The maximum value obtained with each instrument will then be the comparable value. According to the values of Fig. 3, 26 seconds would be the value obtained with all three size penetrometers. However, to test the same area of paper in this illustration six tests were necessary with one penetrometer, two tests with another, and one test with the third penetrometer.

A series of tests were made according to this principle, of testing equal areas of paper, using two cup penetrometers having orifices of ⅜ inch, and 1⅛ inches in diameter. The areas of the orifices corresponding to these two diameters were 0.11, and 0.99 square inch respectively. To test an area of .99 square inches, one test was made with the 1⅛ inches diameter orifice penetrometer, whereas, nine tests were necessary with the ⅜-inch diameter orifice penetrometer. The results of these tests made on paper number C are shown in Table III. Ten sets of such measurements were made. The maximum value of the nine tests made with the ⅜-inch diameter orifice penetrometer are compared with the one value obtained with the 1⅛ inches diameter orifice penetrometer for each of the ten sets. The averages of these values for all ten sets are in excellent agreement.

Again following the scheme of testing equal areas of paper specimen, comparative tests were made using the Williams penetrometer and a cup penetrometer having 1⅛ inches diameter orifice. Since the area of the orifice in the Williams penetrometer is

TABLE III.—OIL PENETRATION VALUES USING CUP PENETROMETERS OF ⅜ INCH AND 1⅛ INCH DIAMETER ORIFICES. 0.99 SQUARE INCH OF PAPER TESTED PER SET. PAPER NO. C.

Set No.	⅜ inch Dia. Orifice (0.11 sq. in.) Individual Values			Max. Values	1⅛ inch Diameter Orifice (.99 sq. in.) Individ. Values—Max.
1	23.4	23.2	22.6	26.0	26.5
	26.0	24.9	21.1		
	22.0	21.0	23.3		
2	22.1	22.3	25.1	27.0	26.3
	24.8	21.3	22.4		
	24.4	27.0	23.7		
3	25.0	27.7	22.0	27.7	28.3
	22.0	23.1	23.5		
	23.9	23.9	21.1		
4	22.4	22.1	21.6	25.2	26.6
	20.6	21.6	25.2		
	22.1	24.1	24.0		
5	24.1	25.5	23.8	25.8	25.5
	22.0	25.8	24.5		
	23.2	21.8	23.9		
6	24.5	22.6	25.2	25.2	24.8
	24.0	20.9	21.8		
	22.9	21.0	22.3		
7	25.6	23.5	21.7	25.6	25.7
	22.8	25.3	24.0		
	24.8	22.0	20.9		
8	22.5	24.7	22.0	25.4	25.0
	21.8	23.0	22.7		
	21.8	25.4	23.0		
9	24.9	22.0	24.0	26.6	27.4
	22.2	26.6	24.1		
	25.9	25.5	24.4		
10	25.3	25.2	24.2	27.2	26.8
	27.2	23.9	21.5		
	26.3	23.9	24.0		
	Mean of Max. Values.....			26.2	26.3

TABLE IV.—COMPARISON OF OIL PENETRATION VALUES USING A WILLIAMS PENETROMETER AND A CUP TYPE PENETROMETER. 4.9 SQUARE INCHES OF PAPER TESTED PER SET

Set No.	Paper No. A: Cup Penetrometer Individ. Values		Max. Value	Williams Penetr. 4.90 sq. in. Indiv. Max. Value	Paper No. D: Cup Penetrometer Individ. Values		Max. Value	Williams Penetr. 4.90 sq. in. Indiv. Max. Value
1	21.1	17.3	21.1	19.3	77.7	72.7	84.9	87.0
	18.5	17.1			84.9	77.0		
	18.4				67.8			
2	17.4	17.5	18.0	22.3	77.9	78.4	85.9	76.8
	15.6	18.0			78.8	78.3		
	17.7				75.9			
3	14.5	17.4	17.4	19.3	75.2	77.1	91.7	83.8
	14.9	16.6			71.0	73.3		
	15.5				91.7			
4	15.3	19.6	19.6	17.2	70.5	76.2	76.2	87.4
	14.9	16.7			70.2	75.1		
	16.5				74.2			
5	17.0	17.1	18.1	18.5	74.0	70.0	79.3	71.3
	18.1	14.3			68.6	74.9		
	15.2				79.3			
6	12.3	15.1	19.4	19.0	67.2	79.4	79.4	86.3
	12.5	19.4			75.1	71.4		
	15.7				77.6			
7	14.8	20.2	20.2	16.7	86.7	76.4	86.7	88.8
	15.2	15.4			83.3	78.2		
	17.4				78.6			
8	14.6	15.3	17.6	15.7	74.7	90.1	90.1	83.1
	17.6	14.8			74.1	71.4		
	17.0				71.4			
9	17.2	13.9	17.9	19.8	76.5	76.4	84.1	84.7
	16.8	17.9			76.2	74.1		
	13.6				74.1			
10	16.7	15.7	19.1	17.2	74.5	76.4	82.3	81.6
	19.1	16.5			76.2	73.1		
	14.0				82.3			
	Mean of Max. Values		18.1	18.5			84.1	83.1

4.90 square inches (2½ inches diameter) while that of the cup is 0.99 square inches, it was necessary to make five tests with the cup penetrometers to test the same area of specimen, (5 × 0.99 = 4.95 sq. in.) The results are shown in Table IV. The average of the maximum values for the five determinations made with the cup penetrometer for the ten sets are in excellent agreement with the average of the values obtained with the Williams penetrometer. This result indicates that if both type instruments, the Williams and the Westinghouse cup had the same size orifice the results obtained with either instrument would be the same.

Conclusion

This study shows that the difference in the time for complete oil penetration of paper using a Williams penetrometer, which has an orifice of 2½ inches diameter, and that obtained with a Westinghouse cup penetrometer, which has an orifice of ⅝-inch diameter, is due to the difference in the size of their orifices.

The same values of oil penetration rate of paper would be obtained by either of these two type penetrometers if both had the same size orifices

Acknowledgment

The author wishes to acknowledge his indebtedness to Messrs. G. F. Holton and H. S. Gregg for making the tests.

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(2) Bulletin V—Williams Instrument Co., Watertown, N. Y.
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Powell River to Close for Week

[FROM OUR REGULAR CORRESPONDENT]

VANCOUVER, B. C., April 13, 1938—For the second time this year the Powell River Company has decided on a temporary shut-down of its plant at Powell River, B. C., largest pulp and paper plant on the Pacific Coast. The mill will be close from April 18 to 23 as orders which were anticipated have failed to materialize. The plant has been seriously affected by the Oriental situation and has been on a five day week schedule since last November.

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Obituary

G. E. Buchanan

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., April 11, 1938—A serious illness of several months culminated Saturday evening, April 9, in the death of G. E. Buchanan, well-known figure in paper mill circles, at his home here.

Mr. Buchanan was one of the founders of the Appleton Wire Works, one of the largest in the industry making paper mill wires. He was secretary-treasurer since its inception, and had been active in the business until he became ill several months ago. Under the guidance of himself and associates, the plant grew from small beginnings with four looms in 1896 to its present buildings occupying an entire city block, and operating more than 60 looms.

The Appleton manufacturer also held a substantial interest in the Northern Paper Mills, Green Bay, Wis., and has been a director and secretary of the corporation for a number of years. He also is a director of its subsidiary, the Tuttle Press Company at Appleton.

Mr. Buchanan's son William, one of the survivors, is also associated with Appleton Wire Works as sales manager. The widow, two sons and two daughters survive him.

In addition to his business career, Mr. Buchanan also was prominent in civic affairs in the Appleton Chamber of Commerce, as a director for many years of the Y. M. C. A., a director of the First National Bank, a member of the Rotary Club, a past master of the Masonic lodge, one of the leading members of the First Congregational Church, and other capacities. He served for a number of years on the board of education of one of the public school districts. He was regarded as one of Appleton's most influential citizens.

Robert A. Pagenstecher

KALAMAZOO, Mich., April 11, 1938—Robert A. Pagenstecher, son of Mrs. Edith C. Pagenstecher and the late Felix Pagenstecher, formerly president and general manager of the Bryant Paper Company, died at Bangor, Maine, on April 1. He was born in Kalamazoo and spent his boyhood in this city. After finishing school he chose to follow in his father's footsteps and at the time of his death was associated with the International Paper Company at Orono, Maine. He is survived by his widow and mother.

Frank Byrne

[FROM OUR REGULAR CORRESPONDENT]

CARTHAGE, N. Y., April 4, 1938 — Word has reached here of the death of Frank Byrne, well known wood pulp dealer, at Quebec, Canada. He was well known in Northern New York paper mill circles an dat one time operated in this section under a partnership with M. J. Mooney. His wife and several children survive.

William Currie

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., April 11, 1938—William Currie, well-known Montreal engineer and vice-president of the Dominion Paper Company, died here on Thursday last, after an illness of several months. He was in his 64th year. A graduate of McGill University, he was for a number of years associated with several large electrical concerns in Canada and the United States. On the death of his father he returned to Montreal to join the Dominion Paper Company, and had been vice-president of the organization for over 20 years. He is survived by his widow, one son and a daughter.

Faster Growing Trees

Faster-growing forest trees may be one of the results of experiments now being carried on by the Forest Service of the U. S. Department of Agriculture.

Until recently, little work has been done in improving wood-producing trees. A hit-or-miss collection of wild trees alone has been used by foresters in all parts of the world. The fast-growing trees offer possibilities for use in making paper pulp, the Forest Service says.

As a result of work started by a Maine paper company in 1924 and continued in cooperation with the Forest Service's Northeastern Forest Experiment Station, a large number of hybrid poplars have been produced. The station has selected some 25 hybrids promising rapid growth and disease resistance and this spring has distributed 248,000 cuttings to federal nurseries in 20 States. Selections will be made from the cuttings found most desirable at the end of a year's growth and the young trees will then be transplanted in the field for further observation.

One of the poplar strains has already produced trees seven inches in diameter and 37 feet tall in seven years' growth in the field. Another hybrid has been developed which is practically resistant to a rust disease and grown in the field is found to keep its leaves when trees not resistant lose nearly all of their foliage in late summer.

Forest Service Experiment Stations in other parts of the country are working with longleaf and slash pine hybrids, ponderosa pine and other valuable commercial species. Seed origin and seed tree progeny studies are also being made. Experience in shelterbelt planting in the Great Plains and in plantings in other areas already indicate the value of planting trees grown from seed produced in the same locality or under similar climatic conditions.

New Self-Aligning Belt Idler

A new self-aligning idler for automatically training conveyor belts without damaging the belt is announced by the Jeffrey Manufacturing Company, Columbus, Ohio. It consists of a standard anti-friction idler pivotally mounted on a supporting cross member, with guide rolls at each end. These guide rolls are mounted on pivoted arms that extend at right angles to the idler in the direction from which the belt approaches. The arms are held in place by an easily removed locking pin. Merely by swinging the arms through 180 deg. and putting the lock pin in place on the opposite side, the guides are made ready to train the belt when traveling in the reverse direction. As there is no pressure between the guide rolls and belt, there can be no damage to the edge of the belt. The guide roll moves outwardly the instant the belt touches it, and in so doing swivels the idler sufficiently to cause the belt to return to normal position.

New Method of Testing Paper Rolls

An entirely new and thorough method of testing paper rolls is now being used by the John Waldron Corporation, New Brunswick, N. J.

As is well known, the hardness of rolls in the past has necessarily been judged by the hardness at the surface, and because the surface of most rolls is given particular attention with respect to hardness, it has been practically impossible to distinguish one roll from another insofar as the depth of hardness was concerned. The existing variation in the below-the-surface quality of rolls has, of course, not been due to any intentional skimping on the part of roll makers, but merely due to the fact that softening in spots could occur beneath the surface and exist there after the top surface had been checked, without the knowledge of either the maker or the buyer.

True, efforts have been made to detect such soft spots and various types of instruments have been used to secure the desired check for maker and buyer, but, such tests, while they did in some cases provide an indication of a roll's density, were, it is said, not accurate in showing up the actual condition beyond the surface finish.

Through the inventive genius of Waldron's own engineers, an entirely new and original type of testing instrument has been developed to achieve definitely the complete test so long hoped for by roll makers and roll buyers. This ingenious instrument when applied to a finished roll immediately indicates the density of the surface area, and on a separate gauge also indicates the density throughout the entire depth of the roll from surface to shaft. Any existing soft spots resulting from a peculiar condition of the paper or a lack of sufficient pressure and time in compressing the paper layers is immediately shown by the use of this new testing device. The development of this "density test" represents an important advance in the methods of insuring long and even wear from paper rolls, for, by subjecting each completed roll to this shop test, there is no longer the danger of rolls containing hidden defects being run in on embossing machines.

Form $600,000 Paper Concern

MONROE, Mich., April 11, 1938.—Charles L. Haas, general superintendent of the Consolidated Paper Company, north side plants here, in conjunction with his brothers, William F. Haas, city attorney of Monroe, and Albert E. Haas, Braddock, Pa., have organized a straw board paper mill company, plants for which they contemplate locating in southern Ohio, close to the coal regions, wheat fields, and manufacturing plants where the finished straw board is used extensively. One hundred tons of straw board are to be finished daily, to be used for corrugated lining.

The company is to be capitalized at $600,000. One half of the capital is to be subscribed locally and in Detroit and Toledo and the balance in Ohio. Incorporation papers are to be filed with the secretary of state of Ohio at Columbus. The site for the plants has not been definitely chosen, William F. Haas said.

Charles L. Haas has resigned his position, effective April 15. He is director of the Consolidated Paper Company, a member of the Monroe Board of Education, and president of the Michigan Affiliated Exchange Clubs.

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Electrochemists Discuss Pulp and Paper

One technical session of the Spring Meeting of the Electrochemical Society will be devoted to Physical Chemistry of the Pulp and Paper Industry. The Electrochemical Society is meeting April 27-30 in Savannah at the Hotel DeSoto. The session of special interest to the pulp and paper industry is scheduled for Thursday from 9 A.M. to 12 M.

The program of the Thursday morning session is as follows:

The Chemistry of Woodpulp Bleaching—John Rue, Hooker Electrochemical Company, The Chemistry of Chlorine, Hypochlorites and Chlorites—W. S. Savell, Mathieson Alkali Works, Chemical Modifications of Cellulose—Louis E. Wise, Consulting Chemist, Chlorine as a Pulping Agent—Umberto Pomilio, Naples, Italy, Corrosion in Sulphate Pulp Mills—Jas. A. Lee, Chemical and Metallurgical Engineering, Corrosion Effects in the Distillation of Talloil—F. V. Vilbrandt and L. E. Ward, Physical Chemistry of Paper-Filling—C. G. Albert, Edgar Brothers, Virginia Polytechnic Institute, Mechanism of Cellulose Reactions—H. M. Spurlin.

Of further interest to pulp and paper men will be the luncheon talk on Thursday noon. D. H. Bissell of the Chromium Corporation of America will give an illustrated talk on Chromium Plating for the Paper Industry. Among the social features are included visits to the Union Bag and Paper Corporation and the Herty Foundation Laboratory.

Other features of the Electrochemical Society's convention are technical sessions devoted to Industrial Electro-Osmosis, Electrodeposition, and a special session devoted to Organic Electrochemistry, Batteries, etc.

On Thursday evening the Society's Joseph W. Richards Memorial Lecture will be delivered at a meeting open to the public. Charles H. Herty will give the Memorial address. Following this, members and guests of the Electrochemical Society will join in a boat trip on the Savannah River. Friday evening an annual dinner-dance will be held at the DeSoto. Following the dinner William G. Harvey will deliver the presidential address. The evening will close with an informal dance. Saturday afternoon a trip will be made to Savannah Beach, where a shore dinner will be served.

The Electrochemical Society, Inc. is an international society started in 1902 and incorporated in 1930. The Society recruits its members from the fields of electrochemistry, electrometallurgy, electrodermics and electromics. The present president is William G. Harvey of the Aluminum Company of America. Secretary of the Society is Colin G. Fink of Columbia University. Phil G. Shuoy of Savannah is chairman of the local committee. This will be the first meeting of the organization in Savannah.

Coinciding with the Electrochemical Society meeting is a meeting of southeastern TAPPI members. The TAPPI men are convening Thursday afternoon at the DeSoto to discuss the formation of a South Atlantic Section of the Technical Association. A short program has been arranged at that time, consisting of an organization meeting and presentation of papers. The papers include The Trend of the Southern Paper Industry, and Woodpulp for Chemical Uses.

Carthage to Teach Papermaking

[FROM OUR REGULAR CORRESPONDENT]

CARTHAGE, N. Y., April 11, 1938.—A meeting of the local board of education was held this week at which it was voted to authorize the addition of a papermaking course in the high school here. The course is the result of a survey of paper mills in this section by the industrial arts instructor. Among those assisting in organizing the courses are C. E. Libby, College of Forestry, Syracuse University; Thomas Loessie, chief chemist of Latex Fiber Industries, Beaver Falls; James R. Church, superintendent of Carthage Papermakers Inc.; Henry Perry, chief chemist of the J. P. Lewis Company; W. Ronald Benson, chemist at the Nation-Paper Products Company; Howard Beyer, of the Lowville plant of the Payne-Lewis Company. The school has $2,755 of papermaking equipment and by next fall will have $3,500 worth, it is estimated. The present equipment includes an experimental beater, table drier, blue print drier sheet mould, ground wood tester, tensile tester, hydraulic press, handmold deckle, two densometers, ream weight scale, oil penetration tester couch rolls and micrometer. The course will include 61 different processes which will take 72 lessons of two hours each day for 40 weeks. Of the total time of the course 25 per cent will be used for demonstration and lectures and the remaining 75 per cent for actual performance by students.

Polish Newsprint Industry Expands

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., April 6, 1938—Conditions in the Polish newsprint paper industry were favorable throughout 1937. Because of prospects for increased exports, including a reported contract with Argentina for the delivery of approximately 1,000 metric tons of newsprint in 1938 and the probable conclusion of similar contracts with Chile, Peru, and Uruguay, it has been found necessary to increase the existing productive capacity, according to a report from the office of the American Commercial Attache, Warsaw. One of the firms manufacturing paper in Poland is engaged in the construction of a new mill which will produce newsprint paper. Production of newsprint paper in Poland during 1937 totaled 39,589 metric tons as compared with 29,123 tons produced in the preceding year. Exports of 1937 totaled only 869 metric tons, all of which went to neighboring European countries.

Bristol's Round-Chart Potentiometers

All of the Pyromaster Round-Chart Potentiometers now manufactured by the Bristol Company, are described in a new bulletin available through the main office of this company in Waterbury, Conn. and branch offices in various cities throughout the country.

This new publication described and explains the simple operating characteristics of Bristol's Pyromaster adapted to: Pyrometers, Reset Free-Vane Pneumatic Temperature Controllers, Ampliset Free-Vane Pneumatic Temperature Controllers, Unitact Electric Temperature Controllers, Tachometers, Resistance Thermometers, Millivoltmeters. A copy of Bulletin No. 507 may be obtained upon request.

Weather Affects Paper Demand

INDIANAPOLIS, Ind., April 11, 1938.—Weather conditions during all of last week were such as to stifle not only the paper business, but practically all other lines. With the worst April blizzard in 20 years raging in the north part of the state and the south half flooded, much of the paper demand declined. Traffic in all sections was paralyzed, with the exception of railroads. Truck traffic in many sections was halted completely. With consumers of paper following their policy of hand to mouth buying, any condition detrimental to the business is apparent almost immediately and this was true last week.

Some good business is "just around the corner" however, for bids are being taken in every part of the state for printing of primary election ballots. The ballots in all counties this year will be larger than usual due to the enormous number of candidates for each office and of course, two sets have to be printed. As soon as contracts are let, printers will be in the market immediately for the primaries are May 3 and ballots must be delivered considerably before that. The volume of paper stock to be used this year will be more than that for some time for this particular purpose.

Cool weather has effectually stopped thought of summer specialties. Some early sales were made, but even inquiries dropped off last week. The first return of warm weather, however, likely will see immediate buying, since stocks in retail hands are low. Tissues are holding up well in view of conditions.

Demand for building paper slumped last week, also due to the weather. Retailers generally, purchased fair stocks a month ago and until they are able to unload part of these likely will not be back in the market.

Demand for waxed papers and cellophane seemed to suffer less than other grades. A steady demand for the former continues to come from bakeries and other users.

In spite of all, prices in all grades held their own.

Dilecto Pipe Ends

The accompanying illustration represents Dilecto pipe ends, a molded laminated product just put out by the Continental-Diamond Fibre Company of Newark, Del. These pipe ends have high electrical insulating properties, good mechanical strength and are uneffected by water, steam, chemicals, or chemical fumes, or by high or low temperatures or rapid temperature changes. They are designed to prevent dangerous grounds and are made in two styles; threaded to fit standard pipe and conduit thread; or plain with three set screws for fastening. Both types are made in standard sizes from ½ inch to 4 inches. Special sizes can be furnished to order. When threaded Dilecto pipe ends are used it is recommended that they be tightened with strap wrenches, although with care regular pipe wrenches may be used.

Uses Newsprint from Black Gum

A press dispatch from Savannah, Ga., under date of April 10 says that "Successful printing of a daily newspaper on paper manufactured from black gum pulpwood was announced today by Dr. Charles H. Herty, chemist, who first developed newsprint from slash pine.

"Bankers throughout the United States will receive copies of The Savannah Evening Press, printed on both black gum and slash pine paper, Dr. Herty said, in a nationwide effort to attract attention to 'a profitable investment field.' Paper manufactured in the Herty Foundation laboratory here was used in the test runs Thursday.

"Dr. Herty said the paper showed up in first-class shape, and added that it was not any more difficult to make paper from black gum than from slash pine.

"Dr. Herty first announced a process from using black gum last October 19. It is a characteristic tree of the Atlantic and Gulf coast swamps. With the new field opening the way to possible use of still other semi-hardwoods, Dr. Herty said it was probable there was 225,000,000 more cords of wood available for newsprint manufacture than had heretofore been considered.

Swedish Paper Mills Expand

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., April 13, 1938.—A number of changes and additions have been announced in Swedish pulp and paper mills over the past few months, according to a report from the office of the American Commercial Attache, Stockholm. One of the largest pulp producers in Sweden, Mo & Domsjo A/B, has announced that a bleaching unit will be added to its sulphite mill at Hornefors to be completed by the end of 1938. This will add 45,000 metric tons per year to the bleached sulphite capacity.

The bleaching unit at the Norrsundet sulphate mill of the Kopparfors A/B has been enlarged from 20,000 metric tons to 40,000 metric tons annually, enabling the company to bleach the mill's entire output when desired.

A sulphite mill with an annual capacity of 6,000 tons of strong sulphite has been built at the Langed mill of Billingsfors-Langed A/B. The output from this mill will be utilized by the company's newsprint mill, which at the same time has been rebuilt and made more up to date.

A new mill for the manufacture of kraft paper is being constructed on the Stora Essingen Island, close to the city of Stockholm.

Boston Paper Salesmen to Meet

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., April 11, 1938.—Sponsored by the New England Paper Merchants Association, a salesmen's meeting is to be held in Ford Hall Thursday evening, April 21. The program includes a film on salesmanship, "Along Main Street," furnished through the courtesy of the Coca Cola Bottling Company. Donald G. Clark, vice-president and comptroller of the Brown & Sharpe Manufacturing Company, Providence, R. I., is to be the speaker, who will discuss selling from the purchasing agent's angle.

ASKS BIDS ON PAPER

(Continued from page 15)

use of the Government departments and establishments in the District of Columbia for the term of 6 months, beginning July 1, 1938.

Former lot 34 Halftone Book has been changed to Supercalendered Book and listed as lot 28, in order to classify it more accurately.

The terms "Single" and "Double" heretofore applied to the designations of Coated Book have been omitted to conform with the present commercial custom. Lots 35 and 36 were therefore consolidated and now form lot 36 under the designation "Coated Book", for the same reason the term "Double" was also omitted from the designation of 50 per cent Rag Double-Coated Book to conform with commercial custom.

A pick-test requirement has been included in the specifications for coated-book paper, lots 36 and 37, in order to measure the quality of adherence of the coating material to the base paper.

The folding-endurance requirement for coated book and cover papers, lots 36, 37, 201, and 202, has been increased in order to obtain paper which will have improved folding and creasing qualities.

Substance 32, sulphite bond, has been eliminated from the schedule (lot 102) since this weight of sulphite bond paper is no longer required, and the folding-endurance requirement of substance 40 has been slightly increased.

The stock requirement for cover paper, lots 203 and 204, has been modified to permit the use of a greater variety of fibers in this class of papers.

An erasing-quality requirement has been added to the specifications for Drumhead Manila Paper, lot 215, in order to meet the requirements of the departments.

This schedule embraces 167 lots, being one less than the number in the preceding schedule. The quantity estimated for the term of 6 months beginning July 1, 1938, is approximately 33,400,000 pounds, as compared with 37,315,500 pounds for the previous contract period of 6 months.

J. G. Whiting Marries Phyllis Brumer

[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, April 11, 1938—James G. Whiting, son of the late S. R. Whiting of the Collins Manufacturing company of Wilbraham, was married to Miss Phyllis Brumer of 20 Davis street, Easthampton, in the Grace church Manse, Elm street, this city, March 30, according to announcements made by the bride's family this week. Rev. Dr. E. B. Robinson performed the ceremony. He is one of the trustees of the estate of the late paper manufacturer, his father, and plans to make his home on Long Island.

To Open 50,000 Ton Sulphite Mill

The Stora Kopparberg Bergslay A/B, oldest company in the world, plan to put in operation early in 1939, a modern, 50,000 ton sulphite mill at Skutska. It will be adopted to the sodium process which is a development of their central laboratory at Falun, Sweden. The company is represented in the United States by the Stora Kopparberg Corporation of 230 Park Avenue, N. Y.

American Writing Operates at Loss

[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, April 11, 1938—The American Writing Paper Corporation is operating currently at a loss, according to an announcement made at the annual meeting of the stockholders in this city last week. Thomas Harper Blodgett, chairman of the Board, made the following report to the stockholders:

"The results of the operations of the last nine months, of 1937 reflects a loss of $81,905. Concerning present operations, present sales prices do not cover increased costs of labor and materials, thus the corporation's operations are running currently at a loss."

The following directors were re-elected: Mr. Blodgett, D. Samuel Gottsman, Russell S. Madden, Lysle E. Pritchard, Frank F. Shaw, George E. Warren, Leon M. Yoerg.

Will Take Over Zeloid Mill Power

[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, April 11, 1938—Announcement by the Holyoke Water Power Company that it would take over the permanent mill powers of the Zeloid Company, if the city acquires the property for unpaid taxes has cleared up one of the annoying problems the Tax Collector has had for some time. The Collector was faced with the problem of taking over the property and then paying for the non-producing mill powers while the property remained in its possession. The unpaid rentals do not have prior lien over taxes and this added to the announcement that the Holyoke Water Power company, lessor, would assume the management of the mill powers has clarified the situation and allowed the Tax Collector to proceed with the foreclosure sale, if the cost of repairing the pentstocks is not prohibitive.

Beveridge-Marvellum Install Press

[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, April 11, 1938—Announcement has been made that the Beveridge-Marvellum company of South Hadley will install in the near future a five-color gravure press to be installed following certain alterations in their present plant. A contractor is now engaged in constructing a new store buiding adjacent to the present factory and when this is put in use, it will free space in the factory for the installation of the new press which will be in operation within the next few weeks. The new machinery will mean quite an increase in employment and will represent with its attendant construction, an expenditure of approximately $75,000.

Belt Conveyor Idler Bulletin

The C. O. Bartlett & Snow Company, Cleveland, Ohio, manufacturers of bulk material conveying and elevating equipment, announces the completion of a new Belt Conveyor Idler Bulletin—No. 80. The new bulletin contains 24 pages. It is fully illustrated, and contains complete details of a new line of Timken bearing equipped Belt Idlers—said to be the first—and thus far the only idlers so constructed that the exact adjustment of the bearings can be made at the factory and the rolls mounted in the brackets in the field without altering or changing this adjustment in any way. Copies of the new bulletin, which gives prices, weights, etc., are available on request.

"The Harvest" by Leon L'Hermitte—Reproduced by Courtesy of Washington University, St. Louis, Missouri

"Today's Seed is Tomorrow's Harvest"

THE PUSEY AND JONES CORPORATION, WILMINGTON, DELAWARE

CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, Financing and Operation of Pulp and Paper Mills

General Construction News

Chattanooga, Tenn.—The O. B. Andrews Company, manufacturer of paper board stocks, news board, corrugated liners, etc., has approved plans for new addition to mill, to be one-story, 200 x 280 feet, reported to cost close to $100,000, including equipment. Contract for general erection has been awarded to the John Parks Company, Chattanooga, and superstructure will be placed under way at early date. The R. H. Hunt Company, Chattanooga Bank Building, Chattanooga, is architect.

St. Helens, Ore.—The St. Helens Pulp and Paper Company, manufacturer of kraft and other paper stocks, waxed papers, etc., has approved plans for extensions and improvements in mill, and will place work under way at early date. General contract has been awarded to the G. H. Buckler Company, Lewis Building, Portland, Ore. Cost estimated close to $50,000.

Richmond, Va.—Reuben Goldman, 602 North 17th street, waste paper products, plans rebuilding of portion of distributing plant, location noted, recently damaged by fire, with loss reported at close to $12,000. Reconstruction will cost approximately a like amount, including handling and loading facilities.

Clinton, Iowa—The Cellophane Division of E. I. duPont deNemours & Co., duPont Building, Wilmington, Del., is planning to begin work at early date on proposed new plant at Clinton, where large tract of land has been acquired, as previously noted in these columns, and has staked out sites for three main units, including a five-story general manufacturing building, three-story office and operating building, and one-story power house. Initial plant is estimated to cost close to $2,000,000, with machinery. It is proposed to build additional units in the future, with ultimate investment approximating $10,000,000. Company engineering department is in charge.

Evansville, Ind.—The Evansville Container Corporation, 810 East Louisiana street, recently organized with capital of 1000 shares of stock, no par value, plans operatin of local plant for the manufacture of corrugated and other containers and boxes. New company is headed by George W. Talbot, Sr. and Jr., and Frank Talbot.

Sacramento, Cal.—Constructing Quartermaster, United States Army, Sacramento depot, is asking bids until April 29 for installation of a refrigeration system for photographic paper storage department, as per plans on file.

Green Bay, Wis.—The Northern Paper Mills, Inc., manufacturer of tissue and other paper stocks, has awarded contract to the General Concrete Construction Company, 431 South Dearborn street, Chicago, Ill., for a concrete stack for new steam-electric power plant, previously referred to in these columns. Company also is said to be planning to carry out erection of main plant building by day labor and work is scheduled to be placed under way soon. The new station is estimated to cost about $750,000, including equipment, for which a number of awards have now been made, with other orders for miscellaneous apparatus to be placed at early date. Sargent & Lundy, Inc., 104 South Dearborn street, Chicago, is consulting engineer.

Warrington, England—The Alliance Box Company, Ltd., manufacturer of corrugated fiber board containers and boxes, has begun erection of new one-story addition to local plant, estimated to cost over $100,000, including equipment. It will provide for large increase in present capacity, and is scheduled for completion late in the summer. Company is now giving employment to about 500 operatives at its Warrington plant and branch mill at Partington.

Chicoutimi, Que.—The Quebec Pulp and Paper Corporation, 132 St. James street, West, Montreal, Que., is reported to be planning modernization and improvements in wood pulp mill at Chicoutimi, ining installation of new equipment for replacements in certain present machinery. Project is estimated to cost about $200,000, with equipment.

Burnie, Tasmania—In connection with construction of the new pulp and paper mill of the Associated Pulp & Paper Mills, Ltd., now under way in the Derwent Valley district, the Government of Tasmania, Hobart, has plans under way for an extension in its Tarraleah power development, to provide power supply to the new plant, as well as to other industries at points along the proposed power line route. About $5,500,000 will be expended for this development over a 36 months period. The paper mill is being designed primarily for newsprint manufacture and will comprise a group of one and multi-story units, equipped for large capacity.

To Abandon North Hoosick Plant

GREENWICH, N. Y., April 11, 1938.—The Stevens & Thompson Paper Company was granted authorization this week by Federal Judge Cooper to abandon its plant at North Hoosick and to transfer the machinery and other equipment to its branch mills at Walloomsac and Greenwich. Permission was also granted by the court to insure the North Hoosick plant for $20,000.

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Henry J. Berger
EDITOR

Ronald G. Macdonald
Editor Technical Section

Lynne M. Lamm
Washington Correspondent

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COMING EVENTS IN THE PAPER INDUSTRY

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Nonotuck Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—Second Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION, Technical Association of the Pulp and Paper Industry— Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION, Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park,American Hotel, Kalamazoo, Mich.

AMERICAN PULP AND PAPER MILLS SUPERINTENDENTS ASSOCIATION, Annual meeting, Royal York Hotel, Toronto, Ont., June 22-24.

A NEW WAGE-HOUR BILL

A new Wages and Hours Bill to replace the measure killed in the special session last year was reported to the House Labor Committee on April 6. Federal regulation of wages and hours is a scheme in the Administration's 'controlled economy' and an important part of the New Deal philosophy for a more abundant life.

In an address on the State of the Union, delivered to the 75th Congress as it convened on January 3, 1937, President Roosevelt stressed the regulation of wages and hours, saying in part: "The farmers of this nation know that a balanced output can be put in effect without excessive cost and with the cooperation of the great majority of them. If this balance can be created by an all-weather farm program, our farm population will soon be assured of relatively constant purchasing power. To raise the purchasing power of the farmer is, however, not enough. It will not stay raised if we do not also raise the purchasing power of that third of the nation which receives its income from industrial employment. Millions of industrial workers receive pay so low that they have little buying power. No reasonable person seeks a complete uniformity in wages in every part of the United States; nor does any reasonable person seek an immediate and drastic change from the lowest pay to the highest pay. We are seeking, of course, only legislation to end starvation wages and intolerable hours; more desirable wages are and should continue to be the product of collective bargaining."

No reasonable person can deny any worker a living wage and fair working hours. The objections against this bill were primarily made and protests against its enactment continue to be raised on the point that it is a step taken by the Administration to take constitutional power from individuals and the states and centralize it in Washington. Notwithstanding that "starvation wages and intolerable hours" are highly undesirable in the national economy, strong opposition has developed against this bill because it seeks bureaucratic control irreconcilable with our form of democratic government.

The major fault of any piece of legislation of this kind is, of course, that it places too much power in the hands of one man and represents unconstitutional relegation of legislative authority. For the above reason organized business, big and little, vigorously opposed any form and all forms of Federal wage and hour legislation. The National Association of Manufacturers and a committee of the Chamber of Commerce of the United States were and still are in accord in this opposition. The Association in opposing the measure said in part: "The practical problems of employment relations—the handling of complaints and grievances and questions of wages, hours and working conditions—can best be met by management dealing with its own employees in the light of local plant and community conditions."

The draft of the new wages and hours bill just completed by a subcommittee headed by Representative Ramspeck of Georgia, calls for a Labor Standards Board of five members to be appointed by the President. This board would be empowered to fix wages for the lower paid industries at not to exceed 40 cents an hour, and to establish a work week of not more than forty-eight hours at the beginning.

The objective, as stated by Mr. Ramspeck, was to empower the board to fix wages and hours gradually so that in the course of time the desired end of a maximum forty-hour week and a 40-cent minimum wage would be attained. The board could not raise wages at the rate of more than 5 cents an hour within one year, thus giving industries affected time in which to adjust their operations to the new standard.

The board would be required in making a decision affecting wages and hours, to take into consideration the wages paid, the number of employees involved, the nature and volume of goods manufactured and the wages paid for like work under collective bargaining agreements, and by employers who voluntarily maintain minimum wages and maximum work standards. The bill supports the principle of annual wages by exempting employees who receive

an annual wage equivalent to 40 cents an hour for forty hours a week. Although the C.I.O. favored the original measure the A. F. of L. opposed it because it placed administration of the law under an appointive board and not in the Department of Justice as was desired.

In the new draft of the measure now under consideration, the determination of the minimum wage by the Labor Standards Board would be required to consider the following points: (1) The cost of living. (2) The relative cost of transporting goods from points of production to consuming markets. (3) Local economic conditions. (4) Such considerations as would be relevant in court in a suit for value of services rendered without contract. (5) The wages established for work of like or comparable character by collective bargaining agreements. (6) The wages paid for work of like or comparable character by employers who voluntarily maintain minimum wage standards. (7) Differences in unit costs of manufacturing occasioned by varying local natural resources, operating conditions or other factors entering into the cost of production.

The factors in determining a maximum working week would require the board to consider (1) The relation of the work to the physical and economic health, efficiency and well-being of employees. (2) The number of persons available for employment in the occupation. (3) The hours of employment established for work of like character by collective bargaining. (4) The hours for work of like character of employers who voluntarily maintain maximum work weeks.

Although the modified wages and hours bill in its present state is altered from its original form, the primary objection to the principle of the bill in centralizing regulatory power in Washington still exists and for that reason is no more acceptable to business than was the original measure killed in the brief session last year and in all probability it will be as vigorously opposed.

India May Revise Tariff on Paper

WASHINGTON, D. C., April 6, 1938—The Government of India has requested the Tariff Board to reexamine the protection afforded the paper and paper pulp industry and to submit a report on protective measures if any, which should be continued after March 1, 1939, the expiry date of those now in effect. In case the investigation of the Tariff Board into the position of the mills reveals that the present revenue surcharge on paper duties is no longer justified, the Board is at liberty to make its recommendations in advance of its main report.

The Tariff Board is engaged in examining representatives of domestic industry and trade. Three leading paper manufacturers had been heard and in the course of their evidence they urged that adequate protection be granted to the domestic paper industry for a further period.

Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association.

Months	1938(c)	1937(c)	1936	1935	1934
January	63.9%	90.3%	76.1%	65.8%	.....
February	68.7%	90.1%	77.9%	70.0%	.....
March	69.2%	90.3%	76.0%	70.5%	.....
April	.....	92.1%	82.3%	70.0%	.....
May	.....	90.6%	81.6%	69.4%	.....
June	.....	87.3%	80.7%	72.3%	.....
July	.....	81.8%	77.3%	64.9%	.....
August	.....	82.9%	81.5%	70.9%	.....
September	.....	78.6%	80.5%	71.9%	58.2%
October	.....	73.5%	87.6%	75.6%	64.7%
November	.....	61.9%	88.0%	75.3%	61.7%
December	.....	54.5%	85.9%	71.2%	59.6%
Year Average	.....	80.6%	81.3%	70.5%	.....
First 13 weeks	67.3%	90.2%	76.9%	68.5%	.....

COMPARATIVE WEEKLY SUMMARIES

CURRENT WEEKS, 1938		CORRESPONDING WEEKS, 1937	
*February 26	71.6%	February 27	91.6%
*March 5	67.7%	March 6	89.2%
*March 12	70.0%	March 13	90.6%
*March 19	68.7%	March 20	90.7%
*March 26	68.2%	March 27	91.1%
*April 2	72.2%	April 3	89.7%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting, Current Weeks					
Ratio Limits	Feb. 26, 1938	Mar. 5, 1938	Mar. 12, 1938	Mar. 19, 1938	Mar. 26, 1938	Apr. 2, 1938
0% to 50%	97	95	80	100	95	63
51% to 100%	205	202	217	197	197	144
Total Mills Reporting	302	297	297	297	292	207

* Subject to revision until all reports are received.
(c) Basic capacity data have been adjusted to correspond with ratings reported by individual companies.

PAPERBOARD OPERATING RATIOS

According to reports from the National Paperboard Association, per cents of operation, based on "Inch-Hours", were as follows:

Mos.	1938 (e)	1937 (e)	1936	1935	Mos.	1938 (e)	1937 (e)	1936	1935
Jan.	55%	80%	61%	61%	July	....	67%	69%	59%
Feb.	61%	86%	67%	67%	Aug.	....	74%	75%	65%
Mar.	....	87%	68%	67%	Sept.	....	70%	76%	69%
Apr.	....	89%	70%	61%	Oct.	....	66%	82%	76%
May	....	86%	68%	61%	Nov.	....	56%	79%	70%
June	....	75%	68%	65%	Dec.	....	46%	74%	60%

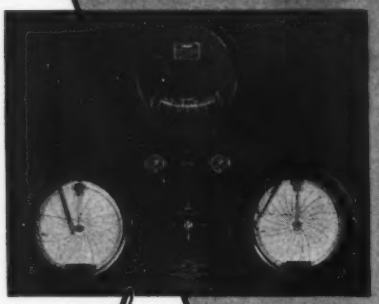
Week end. Feb. 26, 1938—61%
Week end. Mar. 5, 1938—59%
Week end. Mar. 12, 1938—61%
Week end. Mar. 19, 1938—60%
Week end. Mar. 26, 1938—62%
Week end. Apr. 2, 1938—61%

(e) Basic figures revised to include new members of the National Paperboard Assn.

Government Paper Bids

WASHINGTON, D. C., April 13, 1938.—The Government Printing Office has received the following bids for 5,000 pounds of gummed kraft paper in 24 inch rolls: Andrews Paper House of York, 8.575 cents; L. Hyman & Son, 10.5 cents; Barton, Duer & Koch Paper Company, 8.55 cents; Cauthorne Paper Company, 8.39 cents; Stanford Paper Company, 15.125 cents; Resolute Paper Products Company, 10.35 cents less 2 per cent; Walker, Goulard, Plehn Company, 8.98 cents less 2 per cent; Whitaker Paper Company, 10.6 cents; R. P. Andrews Paper Company, 8.75 cents; Enterprise Paper Company, 9.529 cents less 2 per cent; Old Dominion Paper Company, 8.49 cents; Mathers-Lamm Paper Company, 8.5 cents; Virginia Paper Company, 11 cents; Reese & Reese, Inc., 9.87 cents.

For 575 pounds (5,000 sheets) of 75 per cent rag, 21 x 32 inch buff ledger paper; Barton, Duer & Koch Paper Company, 18 cents; Whitaker Paper Company, 23.97 cents; Walker, Goulard, Plehn Company, 22 cents less 3 per cent; Stanford Paper Company, 29 cents.



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REG. U. S. PAT. OFF.

AUTOMATIC ALKALINE PULP COOKING CONTROL

Section of the
Technical Association
of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

Tappi and the Inter-Society Color Council

By John L. Parsons, Chairman TAPPI Optical Properties Committee

As a member organization of the Inter-Society Color Council, which is composed of national associations, societies, and individuals for the dissemination of information on color, the Technical Association of the Pulp and Paper Industry is represented on the Council by the Optical Properties Committee. Specifically the purposes of the Inter-Society Color Council are "to stimulate and coordinate the work being done by various societies and associations leading to the standardization, description and specification of color, and to promote the practical application of these results to the color problems arising in science, art, and industry." The Council is neither a standardizing body nor does it carry out research but it does seek to bring together societies and individuals having a common interest in color.

During 1937 four News Letters, totalling 61 pages, were published by the Council. These are issued from time to time to all members to inform them of Council activities and to provide information on color which is of interest to members. It is planned to make these News Letters even of greater interest during the coming year. Information of general interest to TAPPI members will be offered for publication in the PAPER TRADE JOURNAL.

The 1938 annual meeting of the Council was held on Thursday, February 24th, at the Electrical Testing Laboratories, New York, N. Y. TAPPI was represented by M. N. Davis, L. C. Lewis and J. L. Parsons. The present officers of the Council are Forrest Lee Dimmick, chairman; M. Rea Paul, vice-chairman; Dorothy Nickerson, secretary; and Margaret Hayden Rorke, treasurer. John L. Parsons, chairman of the TAPPI body of delegates, has been elected for a two years term to the Executive Committee of the Council. L. C. Lewis is serving as chairman of the sub-committee on color problems relating to the pulp and paper industry. R. G. Macdonald has just completed a two year term as Secretary of the Council.

The program of the 1938 annual meeting was the most extensive and successful ever sponsored by the Council. The following papers were presented during the afternoon session on February 24th.

1—History of the Design of the Spectrophotometer, by A. C. Hardy, M.I.T., Boston, Mass.

2—Construction of the Spectrophotometer, by J. L. Michaelson, General Electric Co., Schnectady, N. Y.

3—Calibration and Operation of Spectrophotometer, by K. S. Gibson, National Bureau of Standards, Washington, D. C.

4—Application of Spectrophotometric Data to the Printing Industry, by Carl E. Foss, Research Laboratories of the Interchemical Corp., New York, N. Y.

5—Identification of Gelatins for Theatrical Lighting, by Deane B. Judd, National Bureau of Standards, Washington, D. C.

It is understood that these papers will be published in the *Journal of the Optical Society of America.* When available, TAPPI members will be notified.

The evening session comprised several popular discussions of color, as follows:

1—Psychology of Color, by Dr. Forrest Lee Dimmick, Hobart College, Geneva, N. Y.
2—Color in Interior Design, by Ethel Lewis, Associate Editor, Interior Design and Decoration, New York, N. Y.
3—Solar Corona, Painting and Description, by Charles Bittinger, Artist, Washington, D. C.
4—Colored Motion Pictures of the Growing of Crystals Under Polarized Light, by Lloyd A. Jones, Eastman Kodak Company, Rochester, N. Y.

Several hundred people attended the two sessions which were arranged by W. F. Little, R. S. Slauer and R. G. Macdonald.

The Council's Committee on "Who's Who in Color" has compiled a list of authorities in this country on the subject of color. This list will be published within the near future by the Council.

A progress report by the Committee on Problems was made and accepted by the Council. These problems include:

Pharmacopoeia color names, poison label, chromatic filter specifications, color terms, color tests, and color specifications.

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 21-24, 1938.

A. Millard Daniels Made President

A. Millard Daniels has been elected president of the L. L. Brown Paper Company, Adams, Mass., to succeed his father, the late Arthur B. Daniels. The new president, who had served as treasurer since 1920, is also secretary and is succeeded as treasurer by his brother, Rupert B. Daniels. The latter had been secretary since 1922.

A. M. Daniels has been identified with the L. L. Brown Paper Company for 32 years. He has had thorough experience in all departments and for 26 years had acted as general superintendent. R. B. Daniels, the new treasurer, has also been associated with the company for many years, and since 1912 had been superintendent, and now becomes general superintendent.

Photographic Study of the Motion of Fibers and Water in Flowing Fiber Suspensions*

By Lamar A. Moss[1] and Earl O. Bryant[2]

Abstract

Some of the important motions of papermaking fibers in flowing stock suspensions have been investigated. The difficulty of obtaining sharp photographic images of very small particles moving with high speeds is discussed, and it is shown that the method of spark photography can yield very good results. The duration of individual flashes was only of the order of 0.000003 sec., hence sharp images were obtained even for speeds greater than 500 feet per minute. Pictures were taken by light transmitted horizontally and vertically through glass-walled models, so that silhouette images were obtained. (A serious shortcoming of pictures taken by reflected light is mentioned). Multiple exposures (usually triple exposures) showing successive fiber images separated by a time interval of 1/120 sec. were made. From each negative having multiple images, stream lines, vortex formation, and the linear and angular velocities of individual fibers could be inferred. The details of the method for isolating a set of flashes are given.

Fiber orientation in free flow of stock was shown to be random but alignment began as soon as the fibers entered the zone of acceleration just back of, and under, the slice. In all cases studied the acceleration action under the slice or through the inlet pulled out each individual fiber and lined it up in the machine direction. Fibers nearly perpendicular to the direction of flow were not always acted upon, however. This pulling-out action was definitely demonstrated in pictures showing bunches of fibers and air bubbles being elongated in passage under the slice. The alignment as shown in the side views was much more complete than that shown in the top views, and in top views the alignment was stronger for sharp edged vertical slices than for inlets having sloping or curved surfaces.

Comparison of the velocity at the top and bottom of the stream from a vertical slice, especially one having a sharp edge facing the flow, showed an appreciably greater velocity at the top of the stream in agreement with the theory postulated by Lund (3).

It was shown by comparison of velocities of large and small particles that in smooth flow the fibers move at the same speed as the stream and that even during acceleration there is little or no lag.

A head of about a quarter inch back of a vertical slice was found to give good alignment in side views, but the alignment as shown in the top views continued to increase with increased head up to about half an inch. Similar alignment at a head of two feet showed that this same phenomenon was in evidence at high speeds. As computed from the spark frequency and the interval between images, the jet velocity resulting from the 2-foot head was 540 feet per minute.

The width of the slice opening had no effect on the velocity of the stream or the alignment of the fibers with a constant head back of the slice, indicating that the volume of delivery was approximately proportional to the width of the opening.

The alignment in the stream from the slice broke up gradually to become random again six inches from the slice. The use of a viewing box over the stream had no noticeable effect near the slice, but seemed to exaggerate the alignment when used further down the stream.

Consistencies from 0.001 to 0.25 per cent were studied to show that the fiber aligning action of the acceleration under the slice was independent of consistency over this range. Pulp beaten to a freeness of 310 S.-R. exhibited the same phenomena as the unbeaten stock.

In a two-slice inlet system the stream from the first slice tended to flow underneath the pond directly to the second slice, but friction with the pond caused strong turbulence which tended to break up the stream. In spite of this strong agitation the fibers lined up as usual in their passage under the second slice, only to have the alignment quickly broken up after the slice by residual turbulence in the stream. This agitation in the pond was so great that a control rack or a motor-driven wire stirrer in the pond had no appreciable further effect on the fiber behavior in the stream from the front slice. A stirrer in the stream from a single slice gave good agitation and broke up the alignment, but it also caused serious entrainment of air. A series of these stirrers could hardly give uniform action across a paper machine and streaks would probably result in the sheet.

The angular position of a sloping slice did not noticeably affect the alignment of fibers as seen in the side views. In the top views, however, the fiber alignment decreased as the slice was turned further from the vertical. The flatter the slice, the less difference existed between the velocities of the top and bottom layers of the issuing stream and the more slowly was the alignment of fibers broken in this stream. A ridge in the apron cloth under a sloping slice had no effect on the stream conditions. A slanting surface on the bottom of a vertical slice gave flow conditions similar to those under a slanting slice. A similar inlet having obliquely ridged top and bottom surfaces gave strong agitation and broke the alignment entirely.

The curved and the roll-type inlets produced conditions similar to those with the sloping slices but gave somewhat less alignment in top views, because they did not give sharp changes in flow direction to assist in aligning the fibers.

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 21-24, 1938.

A portion of theses submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wisconsin, June, 1937.

[1] Member TAPPI. Gilbert Paper Company, Neenah, Wis.
[2] Champagne Paper Company, New York, N. Y.

The stream over the streamlined spillway of a dam-type inlet showed the usual aligning phenomena in the zone of acceleration, and the stream off the bottom still exhibited strong fiber alignment. Models of the Bell-Irving and Lund nozzle inlets showed a similar lining up of the fibers along streamlines in the zone of acceleration, and the fibers in the issuing streams were well oriented in the direction of flow.

Gough's proposed head box design was found to give recirculation which would tend to even up the flow, although the width of the trough used for these experiments was not sufficient to demonstrate this effect. In this design, and also in the 4-pass head box, the flow around the underpass baffles was found to be along streamlines with no tendency for alignment in the direction of flow, unless the change in direction was accompanied by acceleration at a constriction in the passage. Around overpass baffles, where the upper surface of the stock was free, strong turbulence resulted and insured random fiber orientation.

Introduction

Probably everyone familiar with the art of papermaking will agree that virtually all of the variables of processes from the wood room to the reel are of importance in the determination of that complex weighting of the many properties of paper which defines the final sheet. Papermakers have given interesting discussions of the relative importance of the various processes, some contending, for example, "that paper is made in the beater", while others adhere to the belief that certain variables of the paper machine are paramount. Such divergencies of opinion emphasize the fact that all of the significant variables are of importance.

It cannot be denied that some of the most important characteristics of paper made on a Fourdrinier machine are determined—or limited—by the design of the head box and slice and the wet end of the machine. The state of aggregation or disaggregation, orientation, and motions of the fibers as they leave the slice and go on the wire, and the hydrodynamical and mechanical effects on the wire, determine, for example, that important characteristic known as "formation"; these phenomena determine fiber distribution and orientation in the finished sheet, and hence also influence strength, and account for such important characteristics as anisotropy in tensile and tearing strength, folding endurance, curl behavior, anisotropy in change in sheet dimensions with change in moisture content, etc.

The published literature and patents on head boxes, slices and inlets reveal that the most important contributions have resulted from practical experience coupled with intelligent use of elementary hydrodynamics; practically no work, however, has been done on fundamental problems associated with the head box and the wet end of the Fourdrinier machine generally. Modern requirements for increased rate of production and for more careful control of paper properties demand improvements in design. In the case of the head box and inlet, it seems clear that significant improvements can be made only in the light of hydrodynamical research on flowing suspensions of papermaking fibers. In the past, marked advances have been made by borrowing experimental facts from researches on flowing water, and "intuition" has been a guiding hand. In the belief that intuitional methods have reached their limit, and that future significant advances in design must be based on new factual knowledge, a program of work on the flow of fiber suspensions has been established.

It was considered desirable to commence this program with investigations on the motions of individual fibers under various conditions of flow of the suspension. Examples of fundamental questions on the motions of fibers are the following: In a uniform stream of constant velocity, do the fibers lag behind the water, or do they travel with the same speed? In such a stream, do the fibers align themselves parallel to the streamlines, or do they assume a random orientation? In a region of a flow system where the water is accelerated, do the fibers lag appreciably behind the water (due to their inertia), or do they maintain a speed very nearly equal to that of the water? In a flow system where there is a velocity gradient perpendicular to the stream, as in the vicinity of a wall, do the fibers rotate "end over end", or is the rotational speed almost nil? Under what conditions do fibers aggregate, and under what conditions are fiber aggregates pulled apart?

Attempts have recently been made to answer some of these questions without regard for some of the basic principles of hydrodynamics. While it is believed that some of these questions can be answered fairly accurately by correct application of hydrodynamical principles, it was felt desirable to test all preconceived notions and theories by direct observation. In this paper we describe a method for photographing individual fibers during flow of a suspension, and present some of the significant results obtained and interpretations made.

The Experimental Method

The streak-trail photographic method used by Prandtl *(1)* in his classic work on aerodynamical problems, and used by many others in aerodynamic and hydraulic investigations, has proved invaluable to the study of laminar and turbulent flow of fluids, vortex generation, etc. This method, however, does not give much information on the behavior of individual fibers. A method which would give reasonably sharp images of fast moving fibers was therefore sought. A moment's consideration of the problem of photographing small particles in rapid motion reveals that exceedingly short exposure times must be used. A blurring of 0.01 inch may not be regarded as serious in a photograph of a fast moving object of ordinary size, but a blurring of this amount is equivalent to about ten fiber diameters. If a fiber moves at a speed of 500 feet per minute, a photograph taken at unity magnification and exposure time as small as 0.0001 sec. would exhibit a blurring of this order.

The method finally adopted utilizes light from the spark discharge of a high tension electrical condenser. The duration of the flash is so short (of the order of 0.000003 sec.) that a photograph of a high speed rifle bullet or of a sound wave, taken in the light of the flash, shows quite sharp images. The high tension spark discharge has been used for many years by Foley (*2*) and others in acoustical studies, and in studies of high speed phenomena.

In our arrangement the high tension condenser was charged by the secondary of a transformer rated at 900 volt-amperes, 15,000 volts secondary, 115 volts primary. The wiring diagram is shown in Fig.

1. The condenser, which was built with glass plate dielectric and copper foil plates, had a capacitance of about 0.01 microfarad. The spark gap, formed of 8-32 brass bolts, was mounted on porcelain "stand-off" insulators, and was adjustable. By varying the separation between the electrodes of the spark gap and the resistance in series with the primary of the transformer, a regular rate of flashing of 120/sec. could be obtained; in the absence of such adjustments the rate of flashing was irregular, several flashes sometimes occurring within a half cycle of the voltage wave. In most of the work a rate of 120 flashes per second was used.

Nearly all of the observations were made in a rectangular trough having clear glass walls and bottom. The circulation system is shown in Fig. 2. The head of the trough was flared and contained a galvanized iron system of stilling racks. Various thin copper partitions could be inserted into the trough to form models of head boxes and component parts (baffles, slices, inlet, vanes, etc.) Pictures were taken by light from the spark gap transmitted horizontally, or vertically, through the trough. The optical arrangements are shown in Fig. 3. The condensing lens serves to gather light, project it upon the trough, and into the camera lens; it is believed that the spherical aberration of the condensing lens increases the size of the photographed field through convergence of the outer rays into the camera lens. It will be seen that silhouette images of the fibers are obtained by this method. In the first experiments, attempts were made to photograph the fibers by reflected light. It was found, however, that fibers do not reflect light appreciably except when they are oriented in a particular, small range of angles, and hence such pictures exhibit an apparent orientation of the fibers which is entirely spurious. When silhouette images are obtained, no such spurious optical effects are involved.

The camera used was a 4 x 5 inch Folmer Graflex "Speed Graphic" fitted with a ground glass removable plate interchangeable with the film holder. The lens was a Xenar f. 3.5, focal length 16.5 cm., fitted with a compound shutter. Thus the camera was fitted with both focal plane and compound shutters. Unity magnification was used. The depth of region in which a fiber was in reasonably good focus was about ¾ inch.

In much of the work, particularly where the behavior of isolated fibers was studied for various conditions of flow, very dilute suspensions were used. Single flash pictures were not usually obtained. During the earlier phases of the work it was suggested

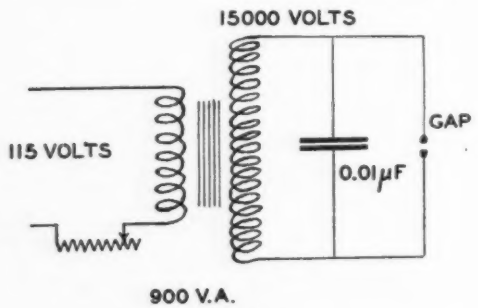

Fig. 1.
Electrical wiring diagram for charging and discharging of high tension condenser.

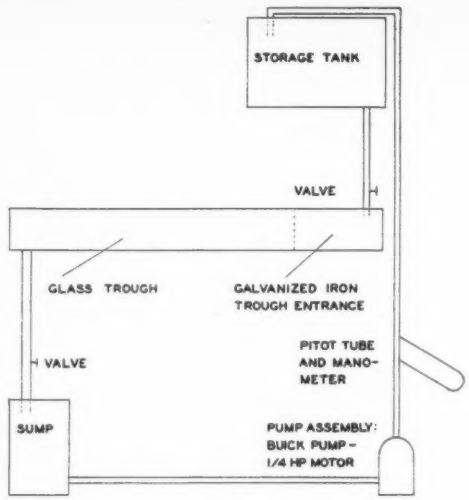

Fig. 2.
General circulation system.

that multiple flash exposures would enable one to infer from a photograph the following important information for each fiber in the field: (a) the paths taken, or streamlines, (b) the linear speed, (c) the angular speed, and (d) the nature of localized eddies. Ordinarily three successive flashes separated by 1/120 sec. were isolated and admitted to the camera. Useful pictures were obtained when the focal plane shutter was used, but sharp shadows of the shutter were imaged on the film, resulting in dark or light bands across the final print.

The technique of isolating a set of flashes was greatly improved by the use of a simple pendulum. The device is schematically diagrammed in Fig. 4. The pendulum consisted of a lead bob supported on a metal wire. During a swing of the pendulum an electrical contact spring connected to the bottom of the bob brushed over stationary electrodes arranged

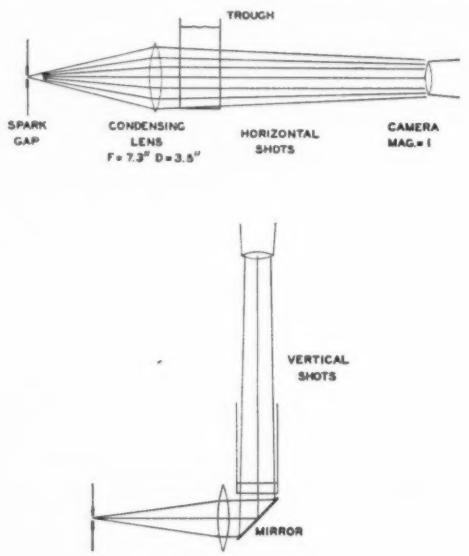

Fig. 3.
Optical arrangements for taking horizontal shots (upper diagram) and vertical shots (lower diagram).

below the rest position of the pendulum. These electrodes and pendulum were electrically connected in series with the condenser and spark gap, so that discharges of the condenser could occur only when the contact spring on the bob was in contact with, or in very close proximity to, the stationary electrodes. Manipulation was simple and fast. With the room dark, the high tension charging current on, and the pendulum held at a predetermined amplitude by an insulated stand, the shutter of the camera was set at "time"; the pendulum was then released, and its passage over the stationary electrodes resulted in the required set of flashes. At the end of its swing to negative amplitude, an automatic catch caught and held the pendulum, and the operator closed the shutter. If a single flash, or pair or triplet of successive flashes was required, a single electrode of appropriate width was used. In some cases a set of two or three flashes separated by longer time intervals, say 1/40 sec. (three half cycles), was desired. To obtain such separation, two or more electrodes separated by appropriate distances were used. Each release of the pendulum would not always result in a definite set of the required kind; it was sometimes necessary to release the pendulum two or more times.

It will be appreciated by the reader that especial care had to be exercised in the choice of photographic film where multiple exposures were involved. If the light of three flashes were admitted to the camera, a portion of the film not covered by a fiber image received an exposure of three units for two units of exposure to those portions under the tripled images of the fibers. Referring to the "H and D" curves of photographic emulsions (giving photographic density vs. the logarithm of exposure), it is seen that, to obtain maximum contrast, the ideal curve would be one which is nil for two units of exposure, and large for three units. This leads to the requirement that the "inertia" and the "gamma" of the emulsion should both be large. Since Eastman Panchromatic Process film satisfies this requirement, film of this designation was used. In most cases, surprisingly good contract was obtained.

In many cases the pulp, which was fractionated long, unbleached western hemlock, was dyed black. While dyeing of the fibers increased the contrast of the pictures, quite satisfactory results were obtained with undyed fibers.

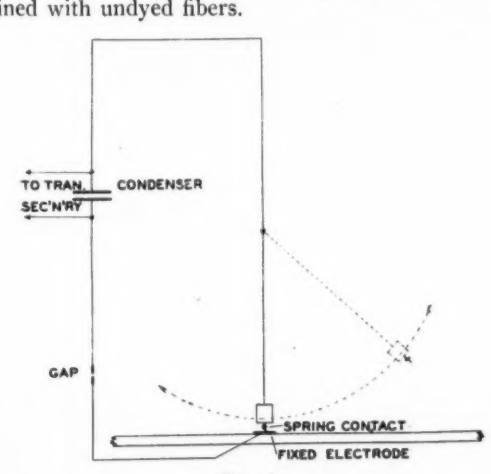

FIG. 4.

Pendulum arrangement for isolating spark discharges of required number and time separation.

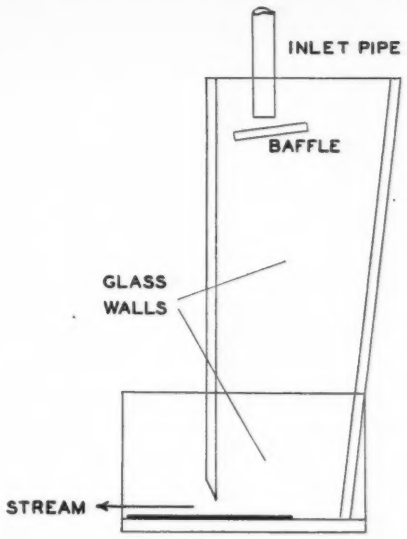

FIG. 5.

Side view of model of high pressure head box.

While most of the results were obtained with the glass trough indicated in Fig. 2, photographs of fibers in streams moving at higher speeds under the action of greater heads were obtained with the glass-walled vessel sketched in Fig. 5.

Applications of the Technique to the Study of Fiber Movements

Fig. 6 shows a selected group of positive prints of typical negatives which are offered for illustrative purposes. The unusual photographic conditions involved in the technique do not produce sufficient contrast to be readily adapted to halftone reproduction; and for this reason, the presentation of results must consist largely of a verbal account of the findings. Much of the detail in the negatives had to be sacrificed to obtain the contrast necessary for clear prints, so the negatives themselves were largely used for study, either by observing them against a well-lighted translucent glass background or by projecting them and viewing the enlarged images. Considerable experience was found necessary for obtaining the maximum amount of information from each individual photograph.

The Single Vertical Slice

The Stream Approaching the Slice.

Photographs were taken of the stock stream before it reached the slice to show the fiber orientation and movements in a stream having no agitation or obstruction to alter the normal conditions of flow. Figs. 6a and 6b show single spark exposures of top and side views, respectively. It is evident from these prints that the orientation of the fibers is perfectly random. Multiple spark exposures to show successive positions of individual fibers as the stream moved forward gave no evidence of any appreciable turbulence in a stream of low, uniform velocity. The successive images showed that each fiber simply moved translationally along streamlines of flow.

This evidence of random orientation of fibers in normal flow disproves the popular belief that fibers tend to align themselves in the direction of flow

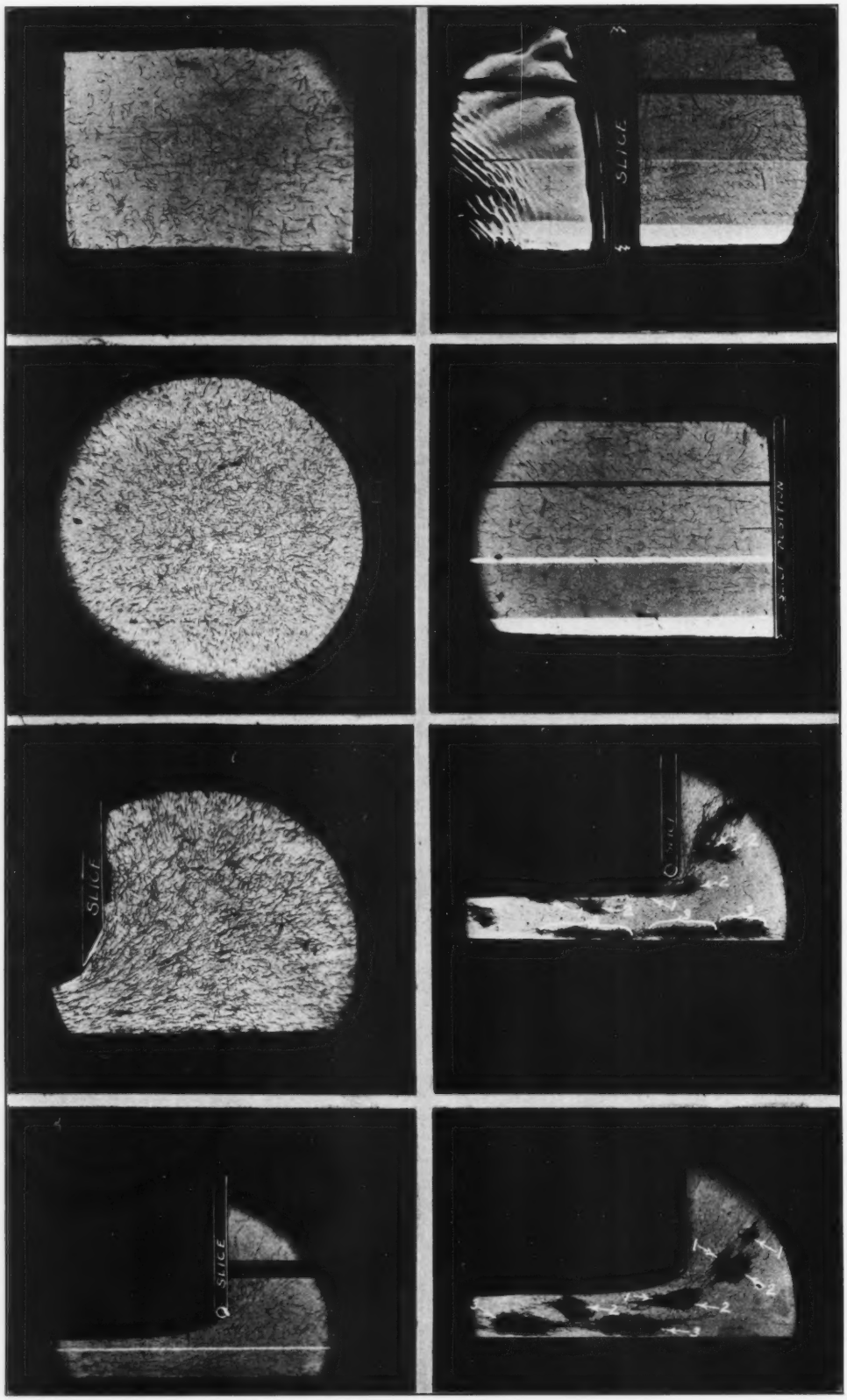

FIG. 6.—For legend see page 51

under these conditions. The classic comparison of a fiber with a log in a stream is, therefore, not valid; and the theories proposed to explain this alleged alignment of logs have no basis of fact because dynamical similarity does not exist between objects of such dissimilar size as logs and fibers. (Theoretical, but erroneous, discussions of the motions of logs and fibers have been given by Lund *(3)*. Whereas the motion of a partially submerged log is greatly affected by inertia and turbulence, inertia has a negligible effect on the motion of papermaking fibers, viscosity of the surrounding water playing the predominant rôle; furthermore, on the basis of hydrodynamical principles, it is impossible for turbulence to exist about freely moving objects as small as fibers.

Immediately before the stream reaches the slice, however, a marked change in the conditions of flow is observed. Instead of smooth, even flow over the entire cross section of the stream, the streamlines of flow converge toward the slice opening (Figs. 6, c and d) and this is accompanied by an increase in speed as shown by the increased intervals between successive images of the fibers. The speed gradually increases from this region to a maximum value, which is reached slightly beyond the slice opening. These results are best shown by the side views (Fig. 6d) but careful examination and proper interpretation of top views focused on various levels of the stream in the "pond" back of the slice indicates the same conditions (Fig. 6e). This acceleration just back of and under the slice was found to be accompanied also by a *breaking up of the random orientation of the fibers and an increasingly strong alignment in the direction of the accelerating action* (Fig. 6f).

Under the Slice

The Stretching Action of the Acceleration Under the Slice.

It was found that the aligning action referred to above began just back of the slice in the same region where the accelerating action begins. As each fiber enters this zone of acceleration, its leading point is acted upon to speed it up and make it tend to pull away from the rest of the fiber. The actual velocity of the individual fiber might be considered as being equal to that of the water at its midpoint. During acceleration, any part of the fiber that is ahead of its midpoint would be in faster moving water and any part back of the center would be in slower moving water; hence, the fiber would be pulled into alignment with the streamlines. This pulling out action was demonstrated by means of fiber bunches photographed in passage under the slice to show that they were stretched and pulled apart. Figs. 6g and 6h show this action clearly by three successive images

Fig. 6.

For Illustration see Page 50

Sample positive prints to illustrate the data obtainable by the photographic method. The direction of flow is from right to left. (a) and (b). Top and side views, respectively, of fiber behavior in a free-flowing stream taken by single spark exposures. (c). Side view of fiber behavior on entering the slice opening, single spark exposure. (d). Side view of the flow under the slice and of the stream, 3-spark exposure to give 3 successive images of each fiber at 1/120 second intervals. (e). Top view showing fiber behavior in the pond at the right and in the stream from the slice at the left, 3-spark exposure. (f). Top view of the stream from the slice, 3-spark exposure, dark and light bands caused by imperfect synchronizing of focal plane camera shutter with the spark frequency. (g) and (h). Side views showing the stretching action of the acceleration under the slice on fiber bunches, 3 sparks at 1/40 second intervals by the pendulum timer.

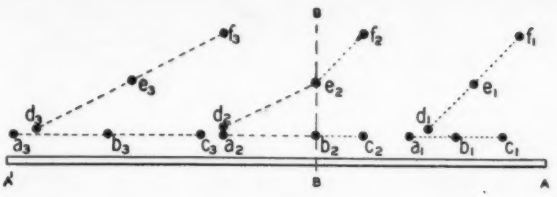

Fig. 7.

of each bunch at 1/40 second intervals as it passed through the zone of acceleration. It will be seen that the length of each bunch and the interval between images increase as the bunch progresses through this zone. Fig. 6g shows the movements of three such bunches and Fig. 6h shows those of two more over the entire zone of acceleration. Two images of a third bunch that had already passed the zone of acceleration are also shown in Fig. 6h. In other photographs which happened to show rather large air bubbles in this zone, the bubbles were found to be stretched out in an elliptical shape. Very small bubbles did not show this phenomenon because their surface tension forces were too strong.

This action of acceleration may be further demonstrated by the accompanying diagram (Fig. 7). Considering the flow of a fluid from right to left in a trough with bottom AA', it may be assumed that the flow is uniform at v feet per second up to a point B, where it is suddenly accelerated to $2v$ feet per second. Now, if three particles (a, b and c), suspended in this fluid are aligned in the direction of flow and spaced at intervals of y feet (a_1, b_1 and c_1), a will reach the point of sudden acceleration at a time interval of y/v seconds ahead of b. After being accelerated to a velocity of $2v$ feet per second, it will move a distance of $2vy/v$ or $2y$ feet in the time required for b to reach the point of acceleration, and the positions will be as shown by a_2, b_2 and c_2. Similarly, when c reaches the point of acceleration, a and b will both have moved $2y$ feet further, so that the positions after acceleration will be as shown by a_3, b_3, and c_3. This illustrates the pulling out effect.

Now if three other particles (d, e and f) are along a line at 45° from horizontal, for example, as shown by d_1, e_1 and f_1, the same increase in interval between particles occurs without any vertical displacement (positions 2 and 3). However, if these points or particles represent the ends and center of a fiber, this interval is fixed by the length of the fiber, so that no increase can occur. Instead, the forces tending to cause this elongation act as a couple to gradually rotate the fiber until it is in line with the streamlines of flow.

Under actual flow conditions, these actions take place more gradually, since acceleration is never instantaneous as pictured here; this example is given to simplify the exposition of this effect.

This stretching action might also be illustrated by considering a more concentrated stock suspension as one large fiber bunch which was stretched out to many times its original length as it passed under the slice. Under the influence of this stretching force, the fibers would tend to line up exactly like the threads of loosely woven cloth when it is pulled on the bias. A practical advantage of this phenomenon is that flocculation of the stock in the head box is broken up, at least in part, by this action.

Velocity Gradient between Layers in the Stream from the Slice.

In all cases, acceleration at the slice was accompanied by a more or less sharp change in the direction of flow. Lund *(3)* has shown, on the basis of hydraulic theory, that this change in direction at the slice causes a velocity gradient between layers of the stream from the slice, the highest velocity being at the top, and the lowest at the bottom. He states that this difference in velocity between layers causes end-over-end rotation of the fibers as they pass through the slice opening. However, the photographs obtained in this study showed absolutely no evidence of any such rotation. This indicated that the strong aligning action of the acceleration was sufficient to completely overcome any tendency toward fiber rotation caused by differences in layer velocities. In accordance with Lund's formula, no appreciable velocity gradient would be expected for the low heads used for most of this work (1.5-2.0 inches) so evidence from these conditions could not be relied upon; but the same alignment of fibers and the same total lack of end-over-end rotation was found when a head of 2 feet was used back of the slice. Exposures of two, rather than the usual three, sparks were used for photographing these high speed conditions in order to obtain better contrast and definition. With this high velocity, the interval between images was so great that it was found difficult to follow successive images of individual fibers in the turbulent stream from the slice, but careful examination did disclose a number of pairs of images at intervals corresponding to speeds of between 507 and 540 feet per minute. It was actually possible to measure differences between the interval at the top and bottom to show greater speeds in the top layers as predicted by Lund. This speed difference would probably be much more noticeable if the measurements were made over a wider interval than the distance between successive fiber images. Still higher velocities of flow would doubtless give greater differences, in agreement with Lund's formula. Pairs of images of air bubbles in this high velocity stream were also studied, and *it was found that they had the same speed as the fibers.*

Fiber Alignment by Change in Flow Direction under the Slice.

The change in flow direction around the slice lip was also found to play a part in fiber alignment inasmuch as less alignment was observed for curved or sloping inlet design models than for vertical slices, and less for vertical slices with rounded or bevelled lips than for those with sharp lips. These differences in degree were particularly noticeable in the top views of the streams from the slices, because in all cases the change in direction was enough to cause good alignment in the side views. All side views showed a pronounced alignment of the fibers in the direction of flow as they passed under the slice. Straight fibers were seen to be perfectly aligned with the streamlines of flow, while curved fibers were as well aligned as their shapes would permit. Successive images of individual fibers showed that the streamlines of flow progressed so that the fibers gave no rotation or change in position relative to the flow direction. Likewise, in the top views, the fiber images showed definite alignment but not as complete as in the side views. In general, however, the fibers, as seen in these top views, were either lined up parallel to the flow or were almost perpendicular to it. The reason for this seemed that to be that, while the fibers originally occupying positions at angles less than 90 degrees from the flow direction were stretched out and aligned by the acceleration under the slice, those at almost exactly 90 degrees from the flow direction were unaffected, because the water had the same speed along their entire lengths. They did not extend far enough in the flow direction to allow the flow at their front ends to be appreciably faster than the flow at their trailing ends. Differences in layer speeds and the change in the direction of flow at the slice did not permit a similar balanced condition for fibers whose lengths were visible in the side views; therefore, their alignment was much more complete.

Relative Fiber-Water Velocity.

It can be shown on theoretical grounds that, in smooth, normal, free flow, there is no relative motion between the submerged fibers and the water surrounding them. It was thought that, even under the influence of the acceleration at the slice, fibers having small mass and relatively large surface area would still show no lag behind the water. Under such conditions it can be shown mathematically *(4)* that, for a sphere with a diameter of the same magnitude as that of a fiber, the retarding effect of inertia would be negligible as compared to the viscous force tending to cause acceleration. If this is true with a spherical body, which has the minimum surface for its mass, then a fiber, with its greater specific surface area, would tend still better to keep up with the stream during acceleration. It is well known that a smaller particle offers more surface in proportion to its mass than a larger one. Therefore, successively smaller particles should show less and less lag during acceleration, and it was thought that a comparison of the relative speeds of various sized fiber particles in the acceleration zone under the slice would be enlightening. The fiber movements under a model of a curved surface inlet were selected for this study, because this inlet gave a longer zone of acceleration and a larger area for observation. Wherever a large fiber and a small particle appeared together, they were traced through their successive images to show that they kept their same relative positions. A large number of comparisons were found to show equal speeds and accelerations regardless of the size of the fiber particles, hence it was assumed that there was no appreciable lag between the fibers and the stream. This same conclusion was also deduced from the observations on the flow under various other slice designs.

Effect of Head Back of the Slice.

From a series of photographs taken to show the conditions of flow under a round lip vertical slice for various heads back of the slice, it was learned that the stream velocity and, within certain limits, also the alignment of fibers were dependent upon the head back of the slice. With a zero head above the lip of the slice the stream showed the random orientation of fibers already shown to exist in a free-flowing stream; but with a quarter inch head, the alignment as observed in the side views was almost complete, and that in the top view was quite distinct. The alignment in the top views continued to increase until a maximum was reached at a head of one inch above the slice lip. Heads as high as 2 feet were also

studied and the same alignment under the slice and in the stream was observed. Under these conditions, however, the alignment in the stream was broken up by turbulence before it progressed more than a few inches from the slice.

The velocity of flow in the stream from the slice was calculated for the various heads back of the slice. By measuring the interval between successive fiber images and multiplying by the spark frequency, a fairly accurate direct measurement of these velocities was possible and these values were compared with those as calculated from the head back of the slice using an equation derived from Bernoulli's theorem. For the low heads (up to 2 inches), the agreement between values arrived at by these two methods agreed very closely; but with a 2-foot head the measured velocity was only 525 feet per minute as compared to a predicted value of 675 feet. The difference was attributed to the greatly increased frictional resistance to flow resulting partly from the high velocity and partly from the fact that a sharp edge vertical slice in a 0.75-inch trough was used.

Effect of the Size of the Slice Opening.

Another series of photographs was taken to show the effect of varying the width of the slice opening when the head back of the slice was kept constant. No difference was noted in the resulting alignment of fibers, and the volume of flow was found to be closely proportional to the height of the slice opening.

The Stream From the Slice.

To determine the behavior of the fibers in the stream at various distances beyond the slice, a group of top and side views were taken with and without the glass-bottomed viewing box touching the top surface of the stream to smooth out ripples and avoid the resulting distortion. A 2-inch head back of the slice and a half inch slice opening were used.

The presence of the viewing box just after the slice caused no change in the flow conditions at that point, but it did greatly improve the top view and allowed a slightly greater thickness of the stream to be shown in the side views. At distances of 6 to 12 inches from the slice, however, where the fiber alignment was almost completely broken up in the free flowing stream, the presence of the viewing box seemed to exaggerate the remaining alignment of fibers.

At a distance of 4 inches from the slice, the alignment had begun to break up, and it became progressively less at 6 and 12 inches. The side views showed almost random orientation 6 inches from the slice. The fact that no rotation of individual fibers could be detected in the short interval between successive fiber images showed the breaking up of the alignment to be very gradual.

Effect of Consistency and Beating.

To show that the phenomena observed in very dilute suspensions of unbeaten fiber also occurred at the consistencies used on the paper machine, a series of pictures was taken at consistencies of 0.001, 0.01, 0.05, 0.1 and 0.25 per cent. Single spark exposures were used throughout this study so that the number of fiber images at the high consistencies would be at a minimum. With increasing consistency the side views showed individual fibers less distinctly but the pulling out and aligning action under the slice was obvious in all cases. Beaten stock (310 S.-R.) exhibited the same behavior under various conditions of flow as the unbeaten fiber, except that the beaten stock showed much less tendency to flocculate at higher consistencies. The presence of rosin size and alum in the stock smeared up the glass walls of the system and made the water cloudy, so that it was impossible to get clear pictures; therefore no conclusions on the effects of these constituents of the furnish could be drawn.

Effect of Rectifier Plates Back of the Slice Lip.

Rectifier plates are used in paper machine inlets chiefly to break up cross currents. In the narrow trough used in these studies, no such currents existed, hence this action was not demonstrated. However, a number of photographs were taken to show the conditions of flow around models of designs by Mason and Wardle *(5)*. Streamlined and non-streamlined models of designs for use with both vertical and sloping slices were used. The top views of the stream from the vertical slice showed somewhat stronger fiber alignment for the streamlined plates, but no difference could be noted from the side views. The other type of rectifier plates was used under a slice sloping at an angle of 15 degrees from the horizontal. Here again, the fiber alignment was stronger from the streamlined plates. The difference between the effects of the streamlined and non-streamlined plates would undoubtedly be greater at higher speeds, under which conditions the latter would tend to cause eddies to produce streaks in the resulting sheet on the machine. Streamlined plates would give smoother flow and have little effect on the fiber alignment.

SLICE AND INLET DESIGNS.

The Double Slice Inlet.

The use of the 2-slice inlet is almost as old as the Fourdrinier paper machine. Paper makers were quick to realize the effectiveness of this arrangement for evening the flow across the machine and for giving agitation to break up fiber flocs in the stock just before it was admitted to the wire. The following investigations of this inlet were made to show the conditions responsible for its effectiveness.

Conditions of Flow with the Slices 6 Inches Apart.

For this study of the flow conditions in a 2-slice inlet, two round lip vertical slices were inserted in the trough 6 inches apart, with slice openings of ⅝ and ⅜ inches, respectively, for the first and second slices. With heads of 3⅛ inches back of the first slice and 2 inches back of the second, photographs were taken of the flow under the first slice, in the pond between the slices, under the second slice, and in the stream from the second slice. It was found that the movements of dyed fibers in the pond could be followed visually when viewed against a well-lighted white background. This method was used to supplement the photographs in elucidating the behavior of the fibers. It was found that the fibers were aligned normally in passage under the first slice and that the accelerated stream from this slice flowed along the trough bottom and underneath the water of the pond straight toward the second slice. Friction with this mass of water in the pond, however, gradually broke up this stream by the formation of eddies whose random movements could be observed visually or by the successive images of fibers

shown in the pictures. This action was accompanied by a spreading of the stream to a greater thickness, so that most of it finally hit the second slice above the slice opening to cause strong turbulence in that area. Directly under the lip of the second slice the fibers were found to be aligned about as usual, but this alignment was broken up immediately after the stream emerged from under the slice. Evidently enough eddies carried from the turbulent pond through the slice opening to the stream beyond to break up the alignment as soon as the zone of acceleration was passed. The turbulence in this stream was so great that it was difficult to follow successive images of fibers in the pictures.

The lack of alignment in the stream from this type of inlet seemed to indicate that ample agitation was obtained in the pond between the slices. However, additional agitation in the pond has often been recommended; and therefore, Williamson's control rack *(6)* [Campbell *(7)* has patented a similar device] and a motor-driven wire stirrer in the pond were investigated, to determine the effect of such agitation on the stream from the second slice.

With the slices arranged as described above, a suitable model of the control rack was placed in the pond midway between the slices, with its prongs extending to the bottom of the trough. It was found by visual observation that this control rack acted as a multiple nozzle, which retarded flow and caused the fast stream from the first slice to spread much higher into the upper layers of the pond. As the streams from the several nozzles flowed together beyond the rack, they produced considerable turbulence, but the movement of the eddies was then largely about vertical axes, instead of the rolling action in the normal pond. Pictures of the stream from the second slice showed little or no difference in the fiber behavior from that already observed for the normal double slice inlet. As before, sufficient turbulence persisted after the slice to break up the fiber alignment. A wire stirrer rotating in the center of the pond between the slices likewise showed little or no effect on the stream from the second slice. The stirrer was found to pick up fibers from the stock and then dislodge them again in bunches, hence such a device would be likely to give trouble on a machine. It was interesting to note that a picture taken of the stirrer in motion (800 r.p.m.) showed the stirrer blades completely "stopped" in three successive positions when a three spark exposure was made. In this same picture, aligned fibers in the stream from the first slice were seen approaching the stirrer, which broke up this alignment, spread the fast stream, and broke up eddies in the pond. This was confirmed by visual observation. Wire stirrers in the stream from the last slice *(8)* were found to cause entrainment of the air. Furthermore, a series of such stirrers could not give uniform action across the machine and streaks would undoubtedly result.

The Effect of Distance Between the Slices.

Papermakers realize that the action of a 2-slice inlet is dependent to a large extent on the distance between the slices, and the adjustment of this distance has been proposed as an aid to controlling sheet formation *(9)*. Pictures were taken to show the conditions existing when the slices were 1.5, 3, 6, and 12 inches apart, the slice openings used being the same as stated above.

With only 1.5 inches between the slices the flow, once started, would continue either with or without a pond in between. In either case, there was not enough agitation to break up the fiber alignment in the stream from the second slice. There was more agitation in the 3-inch pond, and, as a result, the alignment in the stream from the second slice was broken up to a large extent. A maximum degree of agitation for the particular slice openings used seemed to be reached with the slices 6 inches apart, while at 12 inches the amount of stock in the pond seemed to be too great to be thoroughly agitated by the stream from the first slice, and this stream was almost completely broken up before reaching the second slice. Therefore, in this case, the strong alignment under the second slice was found to persist for an inch or so down stream beyond the zone of acceleration.

THE SLANTING SURFACE INLET.

The Effect of Angle.

In many patented inlets, a slanting top surface is used to give a more gradual acceleration and change in the direction of flow through the inlet *(10-17)*, and ordinary straight slices have been modified to permit angular adjustment from the vertical (*18*). To determine the effect of the angular position of a straight slice, photographs were taken of the flow conditions under a glass slice at angles of 90, 60, 30, and 15 degrees from the horizontal. The heads required back of the slice in these various positions for the same volume of flow were 3⅛, 2⅞, 2¼, and 1⅞ inches, respectively.

The angular position of the slice seemed to have little effect on the alignment of fibers, as seen in the side views, whereas the top views of the streams from the slice showed a gradually decreasing alignment from the 90 degree position down to the 15 degree position. The side views of the flow under the 30 and 15 degree slices showed the gradual change from random fiber orientation as the stock reached the slice to complete alignment in the stream issuing from the slice opening. Top views of the acceleration zone under the 15 degree slice were taken through the glass slice to give a more complete picture of the gradual aligning action. The streams from the slanting slices were found to flow more smoothly than that from a vertical slice. The fiber alignment was still quite marked in the stream 6 inches beyond the 30 degree slice, whereas the stream from the vertical slice showed almost random orientation at this distance.

The Effect of a Ridge in the Apron Cloth Across the Machine.

Hyde *(19)* has patented a device for producing a ridge of adjustable height in the apron cloth under a slanting inlet surface and extending across the width of the machine. He claimed that this ridge would cause a swirling in the stream over it, and that this would break up localized streams and give a uniform velocity across the machine. Pictures taken of the flow through a model of this design showed that the ridge made an additional constriction in the stock passage under the slice, but the flow around the ridge was along smooth streamlines without swirling. The resulting fiber alignment was no different from that of the normal slanting surface inlet models.

Slanting Surface on the bottom of a Vertical Slice.

The Voith inlet *(10)* and its various modifications *(11-16)* consist of a slanting upper inlet surface attached to the bottom of a vertical slice which serves as the front wall of the head box. The flow under a model of this design showed conditions closely similar to those observed for the slanting slice, except that slightly stronger alignment of fibers resulted, probably due to the sharp change in direction of flow the stock had to make on entering the passage under the slice surface. Leloff's proposed modification of a vertical slice (*20*) to obtain a high pressure inlet was found to duplicate closely the conditions of flow under the Voith design.

Valentine (*21*) and Aldrich (*22*) both proposed the use of a vertical slice just back of the Voith type inlet to give gentle agitation and to even the flow across the machine. In spite of the small size of the pond between the slices in a model of this design, a marked decrease in fiber alignment was observed in the stream from this inlet; and in a full size inlet with its proportionally longer slanting surface, the larger pond would be expected to give more thorough agitation and insure random fiber orientation. The agitation caused by a control rack *(6, 7)* just behind the Voith inlet model gave almost random fiber orientation in the stream from the inlet, but this device would probably be less effective on a full size inlet, where it would be too far away from the slice opening.

With a vertically set lip on the lower end of the sloping surface of a Voith type inlet, as proposed by Niks *(23)*, the streamlines of flow under the slice were found to leave a small dead space in the corner between the sloping surface and the vertical lip. The resulting fiber alignment was stronger than for the sloping surface alone, probably due to the sharp acceleration in the constriction under the vertical lip.

To demonstrate the effect of oblique ridges on the upper and lower inlet surfaces as proposed by Corcoran *(24)*, photographs were taken of the flow through a model of this design. The fibers lined up as usual on entering the inlet passage, but this alignment was broken almost immediately by the agitation caused by the oppositely directed ridges, and random orientation resulted in the stream from the inlet. It seems possible that the number and size of the ridges could be selected to give the desired amount of agitation for a given set of machine conditions, but its action would be dependent to a large extent on the machine speed and little or no adjustment would be possible.

The Curved Slice.

The Van de Carr inlet *(25)* and its modifications *(21, 26-29)* use an inlet surface curved to conform approximately to the streamlines of flow. Photographs of the flow under a model of this type of inlet showed the fibers lining up in the streamlines of flow to give the usual strong alignment. The alignment observed in the top views of the stream from this slice was not as strong as that for a vertical slice. It was, however, about the same as the alignment resulting from the 30 degree sloping slice. Clements' roll inlet *(29)* is really a modification of the Van de Carr type, in which the curved surface is the surface of a rubber-covered roll of adjustable diameter. Studies of the flow under a model of this design showed conditions similar to those under the regular curved surface inlet.

The Dam-Type Inlet.

Instead of some modification of the conventional slice, Murray *(30)* and Kilberry *(31)* have proposed the use of a dam with a streamlined spillway leading from it to the machine wire. In the flow of stock over a model of this design the fibers were found to be aligned by the acceleration of the stream as it flowed down the spillway without having passed under a slice at all. This showed that the particular set of conditions existing under a slice is not necessary for fiber alignment by the action of acceleration. The fiber alignment in the stream off the bottom of the dam was not complete, but this was not surprising when it was considered that friction between the free flowing stream and the surface of the dam would cause a certain amount of turbulence, which would tend to break the alignment.

Nozzle Inlets.

In the flow of stock through models of the Lund *(3)* and Bell-Irving *(17)* nozzle inlets, the usual alignment was evident as the stock entered the constrictions in the passages. The flow through the Lund inlet was studied with and without its streamlined vane in place just back of the nozzle opening. When in place, this vane divided the full nozzle opening into two smaller openings and also made all the stock enter the inlet at an angle, either from above or from below. Both these effects would tend to strengthen the alignment, and the pictures did show stronger alignment when the vane was in place.

On entering the Bell-Irving nozzle from the pond back of it, the stock was accelerated and the fibers were strongly aligned. Passage through the constriction at the lip gave further acceleration, and therefore, strong alignment resulted in the stream.

In conclusion, it has been shown in this section that all the inlet devices used on paper machines to accelerate the stock to approximately wire speed cause, at the same time, a strong alignment of the fibers in the machine direction. Suitable agitation back of the inlet to break the fiber alignment in the stream immediately after it leaves the inlet may be obtained by the use of a vertical slice or control rack back of the inlet. The double slice inlet with a pond between the slices seems to be particularly effective in this respect.

FLOW CONDITIONS IN THE HEAD BOX.

The flow of stock through the head box was studied only in a general way to indicate the nature of this flow.

Gough's Recirculation Design.

Gough (*32*) considers eddies to be the most effective agents in breaking up localized fast streams in the head box, but these eddies are sometimes difficult to control and are not uniform in their action. To correct these difficulties, he designed a recirculation device for a head box which he claims will give an effective and controllable eddy, and has given a detailed description of the operation of this device (*33*). The essential feature of his device consists of an underpass baffle in the head box separating a narrow passage on one side from a relatively wide passage on the other. Then at a suitable distance above the bottom edge of this baffle a narrow slit is provided along its entire length. The stock is made to pass down through the narrow passage and then up again through the wide passage, and the difference in velocities of flow is said to cause flow through the slit from the wide passage to the narrow

one to produce an eddy around the lower section of the baffle. Upon studying the flow through a model of this device, the stock was found to be accelerated on entering the narrow passage to give fiber alignment but after leaving the constriction in this passage, the alignment was quickly broken up. In flowing under the baffle, centrifugal force caused the fast stream to hug the bottom of the pass and enter the wide return passage with a turbulent pond between it and the baffle. Exactly as in the double slice inlet, this stream and turbulent pond insured random orientation and good agitation. Recirculation of stock through the slit was actually observed visually and shown in photographs. Although the effectiveness of this device could not be demonstrated in the narrow trough used, it would undoubtedly have an evening effect across a machine head box, because the pressure drop at the constriction would be proportional to the square of the velocity of the stream at that point according to Bernoulli's theorem, and hence a fast localized stream would cause more recirculation and friction at that point to retard the stream.

A Four-Pass Head Box

The flow of stock through a 4-pass head box was photographed to demonstrate the flow conditions in a normal head box design. The flow around underpass baffles was found to be along smooth streamlines, but no tendency toward fiber alignment was observed unless this change in direction was accompanied by acceleration due to a constriction of the passage. Turbulence in the passage just beyond the underpass caused thorough agitation. Around overpass baffles, where the top surface of the stream was free, strong turbulence resulted as the stream, coming up through one pass, turned and started down again or passed out over the horizontal spillway corresponding to the apron of a machine.

Further studies, made on a 1:13 scale model of a head box in use on a Fourdrinier machine making book papers at production speeds of 500-700 feet per minute, seemed to emphasize certain defects of the conventional head box. Both the visual observation and the analysis of photographs showed strong channelling of flow through the passages with adjacent eddy regions. In the last pass immediately before the slice, the active portion, as compared to the eddy volume, was small. The reason given for a large passage before the slice, in comparison with the areas of other passes in the box, has always been that it slows down the more violent rate of flow of the fiber suspensions and allows it to even out, so that the flow under the slice to the table is smooth and even. However, it seems that such a design is not efficiently suited to this purpose, because the strong channelling tendency carries completely through the last pass. Also, a large eddy region or "dead spot" in a head box has been credited by paper makers with the formation of fiber lumps. Therefore, this preliminary survey of a commercial head box indicates the value of this method in possible future studies of more efficient design.

Discussions and Conclusions

The results of this investigation show that, regardless of what type of inlet is used, the accelerating action through the inlet causes strong alignment of the fibers in the direction of the flow. If this stream simply flows smoothly out upon the wire, the alignment would probably not be broken up and the resulting sheet would be expected to be strongly grained in the machine direction. Even under the ideal conditions in a hand sheet mold, it is necessary to agitate the stock suspension thoroughly, but gently, to obtain good sheet formation; on the moving machine wire, proper agitation of the stock to break up alignment and to cause uniform dispersion is even more important. But this agitation must be very gentle, so as not to disturb the bottom layers of the sheet as they form on the wire.

This need for just the right amount of agitation on the wire is undoubtedly responsible for many of the conflicting theories on inlet design. With no fundamental basis of fact some designers have realized the need for agitation and put oblique ridges in the inlet surfaces (*24*), semicircular gaps in the lip (*34*) to provide this agitation, or provided agitators on the wire (*8, 35-39*). Others have made every effort to admit the stock to the wire in a perfectly smooth stream to avoid the difficulties thought to result from agitation.

The two-slice inlet has long been giving satisfactory service at slower speeds, though the reasons for its effectiveness have not been completely understood. The results of this investigation show that its action is not simply to provide agitation for uniform dispersion and to even up the flow across the machine, but also to extend its agitating effect to the stock on the wire by means of gentle eddies still remaining in the stream after the slice.

Information obtained from practical papermakers indicates that, at speeds above 500 feet or so per minute, no advantage is derived from the use of two slices. Their explanation for this is that, at these higher speeds, the passage of the stock from the screens through the slice is too rapid to allow time for flocculation, hence no agitation is necessary. However, it seems more likely from the results of this investigation that some other type of agitation comes into play at the higher speeds, i. e., the agitation resulting from difference in speed between layers of the stock stream from the slice.

On the wire moving at approximately the same speed as the stream from the slice, there is no appreciable retarding action, comparable to that caused by the glass bottom of the trough, to exaggerate the velocity difference between the top and bottom layers of the stream from the slice, hence this effect is not great until high speeds are reached, where the velocity gradient is steep in accordance with the equations of Lund (*3*). At speeds of 500 feet or more per minute this action seems to give sufficient agitation on the wire, and too little time is allowed between the screens and the slice to permit flocculation at these speeds; therefore, two slices are not necessary. At still higher speeds, however, this agitation will become excessive and disturb the formation of the first layers of the sheet to form on the wire. A cloudy formation in the sheet will then result. At high speeds the high pressure inlet is therefore necessary to reduce this effect and at the same time to accomplish two other important functions: (1) to give the desired stock speed with less head back of the slice, due to the lower resistance of the more streamlined passage, and (2) to allow finer adjustments of thickness of the sheet across the machine. With a vertical slice the issuing stream undergoes strong contraction in thickness at high speeds;

and with no means to control this contraction across the machine, the uniformity of sheet thickness suffers. The high pressure inlet, however, causes much less contraction, so that the control should be much more effective.

It is obvious that the rod-like shape of papermaking fibers would allow them to fit together most compactly when they are laid parallel. Therefore, when quick sheet closure is desired, the first thin film of fiber on the wire would theoretically be best laid down parallel; and, in view of the greater ease of causing fiber alignment in the machine direction, it would be best to provide for parallel alignment in this direction. Having the apron stop a little short of the slice should ideally accomplish this purpose, since the stock would hit the wire just before being accelerated to wire speed by the slice. The faster moving wire should then assist the accelerating action under the slice to line up the fibers for the first thin film on the wire.

For breaking up the fiber alignment on the wire, the action of the turbulence in the pond of a 2-slice inlet is to be recommended, rather than the rolling action of the stock which takes place on the wire as a result of the greater velocity in the top layers of the stream. The action of the former is uniform across the machine, its action on the wire is not violent enough to disturb the bottom layers of the sheet as they form on the wire, and it is much less dependent upon changes in speed; hence it would seem that a flow evening and agitating device designed to obtain similar conditions in a high pressure inlet would offer the best possibilities for high speed operation.

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Alloy Steel Materials of Construction for Pulp and Paper Mills*

By John H. Faunce, Jr.[1]

Abstract

1. The major troubles in kraft mills are being encountered in digesters, diffusers, evaporators and causticizers.

2. An 18-8 stainless steel has been tried as a remedy for some of the troubles with these pieces of equipment and is proving satisfactory.

3. Other grades of stainless steels are being used for certain applications and test data is not yet available.

4. There is an increasing use of stainless and other corrosion resisting metals in paper mills.

5. There is a need for a metals investigation to determine the correct types for many applications in practically all phases of the industry.

Since 1927 or 1928 there have been many varied uses made of alloy steels in the pulp and paper industry. The majority of the applications were in sulphite service at the beginning, but there has been a growth of employment of stainless steels in the sulphate or alkaline fields. In our desire to study the application of stainless steel to your industry we made various preliminary investigations. We found that much work had been done by the Materials of Construction Committee of TAPPI and outside agencies which showed to a large degree the rapidly increasing acceptance of alloy steels in pulp and paper mills. We also learned that a number of facts have been developed about the extensive usage and relative service life of these steels for specific applications. Certain papers on investigations, such as the one given a year or so ago by F. L. LaQue, quite thoroughly discussed alloy steels used for sulphite pulping equipment. However, as far as could be determined there was practically no available information showing the advisability of using a particular grade of alloy steel, or other metal, for a specific piece of equipment operating under conditions more or less general to the industry.

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[1] Markets Development Division, American Rolling Mills Company, Middletown, Ohio.

Little Information Available

The Materials of Construction Committee informed us that little information of this kind is available and they recognized the fact that it is needed.

The chairman of the committee and ourselves then decided that contacts should be made with operating units in the industry to find what problems the mills were having, what materials of construction were used, and why they were used.

A list of twenty-two of the new southern kraft mills which should be called on was developed. These were chosen as most of the existing information and records pertained to acid service, and it seemed advisable to concentrate in the beginning of our investigation on alkaline procedures because of the growth in this field. In addition, we made contacts with a number of other mills doing various types of pulping, as well as some equipment builders, in an effort to determine generally the metals being used; and to gain information about your industry prior to the actual survey.

1. To learn what corrosive and abrasive conditions are encountered by pulp and paper producers.
2. To find what specific problems in this connection are faced by individual mills.
3. To study what is being done in specific instances to overcome such problems.
4. To try to determine what can be done to make available to all mills and equipment builders, reliable information of the most effective solutions to general problems.

Four Definite Purposes

In this work we had four definite purposes in mind which we will list for you as follows:

We were fortunate in that to some degree we were able to accomplish something on each one of our four major purposes. In this survey the superintendents, technical directors, chief engineers, chief chemists and purchasing agents were contacted and in practically all mills these men gave us excellent cooperation. It was frankly admitted, in the majority of cases, that there was a need for a study of this kind.

We have spent several months in making this survey and I covered more than 5,500 miles in contacting mills and individuals. We were fortunate in being able to build up considerable basic information as well as general material data of both an open and confidential nature.

Because some of our information is confidential, and because it is rather broad in form, it will be impossible to comprehensively list it for reference data in a discussion of this kind. However, we will state in a general way a few of the outstanding things that we found in our contacts with the sulphate mills so you will have a semblance of a picture of your industry from a metal angle.

Digesters

We learned that some of the plants were having rather bad pitting in their plate digesters, particularly around the welds. An 18-8 stainless liner has already been tried as a means of combating the combined corrosive and abrasive action encountered in the bottom of the digesters. The lining is placed in the lower part of the cone and extends to the steam inlet. It is made up of ⅛-inch plate and is proving most satisfactory.

The steam and liquor inlets and outlets on the digesters are usually made of ordinary steel in which case they show quite a large amount of cutting. However, no wide usage of alloy materials was uncovered in our contacts, but in a few cases it is being tried and proving very satisfactory.

Diffusers and Evaporators

The perforated screens used in diffuser bottoms are made of ordinary steel in many cases, but the tendency of the mills seems to be towards corrosion and abrasion resistant metals. One would expect that a stainless steel would prove most satisfactory for this application. However, because of the diversity of materials that are being tried in individual mills for this particular piece of equipment, it would seem advisable that comprehensive tests be performed to see actually what type of metal will serve most satisfactorily as well as economically.

Black liquor evaporators seem to be a source of worry as there is quite severe pitting encountered at the top and sides of the units. Some mills have replaced evaporator shells several times. It was also found in these units that tubes and tube sheets are subject to fairly rapid deterioration and this condition has been overcome by the use of an 18-8 stainless steel flashing and lining and by the use of stainless steel tubes and tube sheets.

In one particular mill we were informed that they have found, that although the solution handled in the black liquor evaporator is *basic* the vapor is decidedly *acid,* which undoubtedly accounts for the severe corrosion encountered near the top of the unit. From all indications 18-8 stainless is proving most satisfactory but there is a possibility that some other stainless grades might adequately cope with the situation, and might even more economically overcome the conditions encountered. This fact will certainly bear investigation as it seems to be practically a universal problem.

Causticizing Equipment

A few of those mills contacted are encountering considerable difficulty with their causticizing equipment. Some do not complain of the causticizing tank itself, but complain of the rapid failure of tubes leading from the tank to other pieces of equipment. We believe, off hand, that this is a combined corrosion and abrasion problem but would not like to make any statements until it has been possible to conduct definite investigations. This question is even now being studied with the idea of finding a metal that will stand up satisfactorily and economically in the face of the conditions encountered. From a report from our Research Division, it would appear that a 12 or 13 per cent straight chromium grade of stainless steel would prove perfectly satisfactory for the application, but this will not be definitely known until the materials tested have had a chance to prove themselves under actual operating conditions. A few mills are having trouble with their settling equipment and we believe this is the same general condition that is encountered in the causticizers.

Condenser and evaporator tubes seem to give trouble to the sulphate mills and it has been found by the mills themselves that stainless steels of the 18-8 type are proving very satisfactory for this application.

Fatty acid reclamation equipment is another source of trouble and although we have placed materials in mills for tests, we have not today built up any in-

formation of value as the time has been too short. Various materials of construction, among which are the stainless steels, are being tried for wash pans, metal tubes in direct heaters, pumps of all kinds, in vacuum filters and multiple effect evaporators, filter spouts, and handling salt cake and salt cake dust. We will not take those up here as they are probably very familiar to a good many of you, and in addition the extent of trouble and usage is probably included in the data that James A. Lee has assembled in conjunction with his committee questionnaire report.

Increasing Application

With reference to stainless usage in paper mills, we did find that there is an increasing application, and these metals seem to be giving good service for many pieces of equipment such as head boxes, flow boxes, regulating tanks, drainage pans, jordan bars, doctor blades, rolls, distributing tanks, suction boxes and other applications. The 18-8 grades are apparently the most widely used stainless steels in this phase of your industry, and we believe that it would bear investigation to see if in all cases it is the most economical grade to use.

Available Alloys

Now, we have very briefly stated what we have found in general concerning the sulphate or alkaline phase of your industry, and in some cases told you what the mills were doing with reference to overcoming their individual problems. We are inclined to think that in many cases the mills are on the right track, although we have nothing other than the mills' experience to back up this statement.

We have found there is little known generally about the many existing types of stainless steels. In practically all cases where stainless steels are used it is either an 18-8 type or an 18-8 SMo, which is a modification of the standard analysis with molybdenum added.

With this in mind, we wish to call to your attention the fact that there are other types of stainless steels whose alloy content ranges from 12 or 13 per cent chromium to as much as 25 per cent chromium and 12 per cent nickel.

It is significant that chromium is the essential alloying element of these materials about which we speak, and all stainless steels depend on the presence of it for their major corrosion-resisting properties. Other elements, such as nickel, molybdenum, columbium, copper, silicon and tungsten may be added in addition to the chromium in order to impart certain physical or corrosion-resisting characteristics, or in some cases both.

The great durability of stainless steels is attributed to the formation of a transparent oxide film on the surface of the metal. This film is stable, so thin that it is invisible under the microscope, is tightly adherent to the metal itself, and is a protection against corrosive action. This is a hypothesis which is generally believed true, and inasmuch as all results and experiences can be definitely attributed to it, it would seem logical that the alloy steels containing chromium will show the greatest corrosion resistance under oxidizing conditions. However, as has been previously mentioned, it is logical to expect that the addition of elements such as nickel and molybdenum, which have a specific resistance to non-oxidizing chemicals, would improve the resistance of steel to the chemicals which do not readily attack the added agent itself.

In addition to the ability to resist corrosive attack, the alloy steels containing chromium have a higher strength which makes possible the use of high unit stresses in designing, and hence lighter sections. Combining this fact with the excellent corrosion and abrasive resistance of the material it makes possible an entirely new and modern type of construction that is exceedingly light and permanent.

In general it can be said of stainless steels that their chemical resistance to corrosion is almost a direct, but far from linear function of the alloy content of the metals in question.

There is a wide range of alloy steels from which to choose, as well as many other basic types of metals that might be considered comparable to these for your uses. Since this is true, we believe that tests should be performed that would give some indication of the service life of stainless steels, and would compare them with other metals.

Recommendations

Therefore, it is suggested that a group be set up to work with the Materials of Construction Committee of TAPPI to study the applications of ferrous metals and alloys in the industry. It would be the purpose of this group to develop constructive basic information which could be made available to all mills. These data, in many cases, would probably give the most effective solutions to the general problems of the industry. These solutions would, undoubtedly, be a very definite basis from which the individual mill engineers could work on any specific problems they have that are not general to the industry as a whole. This work will necessarily require the efforts of individuals well acquainted with the study of metallic corrosion and abrasion, such as research engineers of companies whose products would have to be tested. It will require the cooperation of the pulp and paper mills and individuals in your organizations, but it will provide definite, constructive information when the resulting data are assembled which will set up some standard by which the industry can choose the material best suited for an individual need.

Working on the Problem

Our company for one, is glad to offer our services in building up such data as would seem necessary. In doing this we hope to develop such constructive information as will enable us to most intelligently supply you with the proper materials of construction. Other agencies and organizations will no doubt likewise be glad to work on this problem.

We shall gladly make available to such a committee all information we have gathered to date to assist in launching their further investigations. Much of the information is rather broad in nature and in most cases is quite informative. In the gathering of this information it was necessary for us at times to state that we would not divulge certain portions of it to any agency or group and that part, of course, will necessarily be withheld. However, we do not believe this will detract seriously from the conclusions we have been able to draw.

Review Of The Paper Industry Literature

Abstracts Compiled By the Abstracts and Bibliography Committee of the Technical Association of the Pulp and Paper Industry, A. Papineau-Couture, John F. Ohlson and Clarence J. West, Chairman of the Committee.

Copies of United States Patents can be obtained from the United States Patent Office, Washington, D. C. for 10 cents each. Send currency, not stamps.

Machinery

Wet Press Arrangements in Paper Machines. William H. Millspaugh. Brit. pat. 463,188 (March 23, 1937).—In a cylinder or fourdrinier machine, above the upper run of the first wet-press felt and subsequent to the first wet press these is a second wet press having an upper plain roll and a lower roll with a lower stationary suction transfer box and an upper stationary water- and air-withdrawal suction box, and the second wet-press felt passing between the lower roll and the first wet-press felt and back through the bite of the second wet press.—A.P.-C.

Cylinder Paper Machine. The Ruberoid Co., Ltd., and Stewart Proudlock. Brit. pat. 464,713 (April 23, 1937).—In a cylinder paper or board machine, a rise or fall in the level of pulp in a vat is used to increase or reduce, respectively, the rate of removal of white water from within the cylinder mold. The vat level may be maintained substantially constant by a weir from which pulp flows to a float chamber. The control may be applied to removal of surplus white water or also to that returned to the mixing box. In addition, variations in the level in the mold may be used to control the outlet side of the pump supplying the mixing box.—A.P.-C.

Machinery of a Paper Converting Plant. Papier-Ztg. 62, no. 63/64: 1042, 1044 (Aug. 7, 1937).—The different operations for manufacturing letter paper and envelopes are described.—C.J.W.

Operating Speed of a One-Vat Board Machine. Wachbl. Papier-Fabr. 68, no. 17: 322; no. 21: 402; no. 22: 417 (April 24, May 22, 29, 1937); B.I.P.C. 8:61.—The inquirer wishes to raise the speed of his one-vat board machine producing white woodpulp boards without reducing their square meter weight (357g/ sq. m.) or quality. The present speed is 13.8 m. per minute. Increases to 15-16 m. per minute are feasible, provided that the pulp is not too slow and experienced workers are available. No higher speeds should be attempted or a large amount of waste will result.—C.J.W.

Device for the Barking of Wood. Franz Eichler. Aust. pat. 147,046 (May 15, 1936).—The device is composed of a shaft around which rotates arched knives which are pliable so that logs of different diameters can be barked.—J.F.O.

Arrangement for Barking. E. Orrmell. Swed. pat. 88,024 (Nov. 24, 1934).—A device to limit the up and down motion as well as the side motion. The device is bow shaped and is for a certain type of barker.—J.F.O.

Feed Device for Barking Machines. W. Bezner. Ger. pat. 643,293 (April 16, 1935).—Arrangement of the feed or conducting arm.—J.F.O.

Knife Holder for Wood Barkers or Cutting Machines. Maschinenfabrik Kappel, G.m.b.H., Chemnitz.—The knives are kept clean by a shower of water.—J.F.O.

Device for the Barking of Logs and Similar Materials. W. Bezner. Ger. pat. 643,247 (April 16, 1935).—Arrangement for swinging the arm containing the barking knives.—J.F.O.

Process for Handling of Wood for the Purpose of Loosening the Bark. Vikmanshytte Bruks A.B., Vikmanshyttan. Swed. pat. 87,618 (Nov. 18, 1933). The wood is treated in a container where it is sprayed with a stream of warm water. The water is heated direct or indirectly and is circulated by means of a steam pump or an injector.—J.F.O.

Pulp Digestor. A. B. Nordiska Armaturfabrikerna, Stockholm. Swed. pat. 88,208 (April 11, 1930).—The invention concerns a circulating system which claims good mixing and uniform heating of the digestor contents.—J.F.O.

Doctor Blade Capable of Adjustment, Especially for Paper Machines. K. Schmidt. Ger. pat. 644,474 (Oct. 1, 1936).—Arrangement for preventing the doctor blade holder from sagging.—J.F.O.

Dewatering Felt for Paper, Board and Similar Machines. Sachsische Filztuchfabrik G.m.b.H., Rodewisch. Ger. pat. 645, 441 (Dec. 9, 1933).—Threads in either or both directions are covered with rubber, thus allowing the felt to stretch in the machine direction and assist in water removal, and also preventing the felt from hardening or becoming incrusted.—J.F.O.

Damages to Paper Felts. H. Mendrzyk. Wochbl. Papier-Fabr. 68, no. 26: 485-88 (June 26, 1937).—Injuries to the paper felt, due to the presence of alkali resulting from the manufacturing process or from faulty washing of the felt, due to the presence of acid resulting from the hydration of the alum, due to the action of sunlight during storage, due to insects and due to bacteria, are briefly described and methods given for detecting and proving the above causes of the damage.—J.F.O.

Wallquist's Fiber Separator. Wochbl. Papier-Fabr. 68, no. 30: 562-63 (July 24, 1937).—The fiber separator consists of two shower pipes provided with special nozzels spaced about 10 cm apart through which water at a pressure of 2 to 3 atmospheres is forced obliquely onto the stock on the wire. Tearing lengths tests with and across were taken to show the improvement in ratio and stocks of various fiber furnishes were used.—j.f.o.

Knotter. E. & M. Lamort Fils, Vitry-le-Francois. Swed. pat. 88,210 (Aug. 28, 1933).—The knotter is composed of a cylinder screen whose surface consists essentially of rings.—j.f.o.

Process for Covering Hollow Cylindrical Suction Roll Casings. Dominion Engineering Works Ltd., Montreal. Swed. Pat. 87,563 (June 4, 1935). The circumference is provided with grooves and projections in alternating rows and at a suitable distance apart.—j.f.o.

Imports of Paper and Paper Stock

Giving Manifests of New York, Boston, Philadelphia and Other Ports, of Newsprint, Wrapping, Writing, Coated, Blotting, Tissue, Strawboard, Wallboard, Cigarette Papers, Sulphite, Kraft and Ground Wood Pulp.

NEW YORK IMPORTS

WEEK ENDING APRIL 9, 1938

SUMMARY

Cigarette paper .....951 cs.
Wall paper ..... 2 cs.
Wall board .....40 bdls.
Paper hangings .....5 bls.
Newsprint .....4,160 rolls
Printing paper .....141 rolls, 42 cs.
Wrapping paper .....2,373 rolls, 587 bls., 7 cs.
Packing paper ..... 8 cs.
Drawing paper .....4 cs.
Filter paper .....4 cs.
Filter mass .....1 cs.
Filter compound .....100 bls., 50 cs.
Surface coated paper .....22 cs.
Surface baryta coated paper .....30 crates, 76 cs.
Metal covered paper .....56 cs.
Basic paper ..... 24 crates, 26 cs.
Photo paper .....1 cs.
Decalcomania paper ..... 30 cs., 9 drums
Decalcomanias .....18 cs.
Transfer paper .....9 cs.
Transparent paper .....5 cs.
Colored paper .....3 cs.

CIGARETTE PAPER

H. H. Strauss, *Paris,* Havre, 216 cs.
Champagne Paper Corp., *Paris,* Havre, 694 cs.
De Manduit Paper Corp., *Paris* Havre, 3 cs.
Braunstein Freres, Inc., *Paris,* Havre, 38 cs.

WALL PAPER

——, *Yamazuki Maru,* Yokohama, 2 cs.

WALL BOARD

A. H. Morner, *Rydboholm,* Gothenburg, 40 bdls.

PAPER HANGINGS

W. H. S. Lloyd & Co., *American Farmer,* London, 5 bls.

Newsprint

Wilkinson Bros. & Co. Inc., *Rydboholm,* Kotka, 81 rolls.
N. Y. Evening Journal, *Markland,* Liverpool, N. S., 261 rolls
N. Y. Tribune, *Markland,* Liverpool, N. S., 1,549 rolls.
World Telegram, *Markland,* Liverpool, N. S., 553 rolls.
Brooklyn Daily Eagle, *Markland,* Liverpool, N. S., 674 rolls.
Herald Statesman, Inc., *Markland,* Liverpool, N. S., 40 rolls.
Jay Madden Corp., *Mormacsun,* Kotka, 244 rolls.
Lunham & Reeve, Inc., *Mormacsun,* Kotka, 172 rolls.
Perkins Goodwin & Co., *Hansa,* Hamburg, 80 rolls.
Jay Madden Corp., *Hansa* Hamburg, 177 rolls.
Jay Madden Corp., *Hansa,* Bremen, 329 rolls.

PRINTING PAPER

R. J. Saunders, *Queen Mary, Southampton,* 5 cs.
Dingelstedt & Co., *Hansa,* Bremen, 141 rolls, 37 cs.

WRAPPING PAPER

C. S. Allen Corp., *American Farmer,* London, 7 cs.
——, *Rydboholm,* Gothenburg, 2,373 rolls, 587 bls.

PACKING PAPER

——, *Hansa,* Bremen, 8 cs.

DRAWING PAPER

H. Reeve Angel & Co., Inc., *Antonia,* London, 4 cs.

FILTER PAPER

H. Reeve Angel & Co. Inc., *Antonia,* London, 4 cs.

FILTER MASSE

A. Giese & Son, *Hansa,* Hamburg, 1 cs.

FILTER COMPOUND

H. Reifenberg, *Hansa,* Hamburg, 100 bls., 50 cs.

SURFACE COATED PAPER

Gevaert Co. of America, *Black Heron,* Antwerp, 22 cs.

SURFACE BARYTA COATED PAPER

Dingelstedt & Co., *Konigstein,* Antwerp, 33 cs.
Globe Shipping Co., *Hansa,* Bremen, 30 crates.
L. A. Consmiller, *Hansa,* Bremen, 43 cs.

METAL COVERED PAPER

A. Hurst & Co., *Hansa,* Bremen, 44 cs.
K. Pauli Co., *Hansa,* Bremen, 12 cs.

BASIC PAPER

Dingelstedt & Co., *Konigstein,* Antwerp, 1 cs.
Globe Shipping Co., *Hansa,* Bremen, 24 crates, 25 cs.

PHOTO PAPER

J. J. Gavin & Co., *Queen Mary,* Southampton, 1 cs. (unsensitized).

DECALCOMANIA PAPER

B. F. Drakenfeld & Co., *Ausonia,* Liverpool, 30 cs., 9 drums, (duplex).

DECALCOMANIAS

Sellers Transportation Co., *Hansa,* Hamburg, 18 cs.

TRANSFER PAPER

Atlantic F'd'g Co., *Hansa,* Hamburg, 9 cs.

TRANSPARENT PAPER

M. J. Corbett & Co., *Bilderdyk,* Rotterdam, 5 cs.

COLORED PAPER

J. W. Hampton, Jr. & Co., *Black Heron,* Antwerp, 3 cs.

TISSUE PAPER

Atlantic F'd'g Co., *Hansa,* Hamburg, 1 cs.

DESIGN PAPER

Wilkes-Barre Lace Manfg. Co., *Ausonia,* Liverpool, 1 cs.

PAPER BOARD

J. P. Heffernan Paper Co., *Black Heron,* Antwerp, 4 cs.

PAPER TUBES

——, *Hansa,* Bremen, 46 cs., 61 ctns.

MISCELLANEOUS PAPER

Japan Paper Co., *Yamazuki Maru,* Kobe, 74 cs.
Standard Products Corp., *Paris,* Havre, 8 cs.
E. Fougera & Co., *Paris,* Havre, 25 cs.
H. Reeve Angel & Co. Inc., *Rydboholm,* Kotka, 1 ble.
Paper Sales Agency Co., *Rydboholm,* Gothenburg, 2 rolls, 1 cs.
W. Bersch, *Black Osprey,* Rotterdam, 1 cs.
——, *Hansa,* Bremen, 91 bls., 220 rolls, 39 bdls.

RAGS, BAGGING, ETC.

Jaffee Products Co., *Yucatan,* Havana, 295 bls. rags.
W. Steck & Co., *Yamazuki Maru,* Kobe, 94 bls. rags.
Delia Waste Products Co., *Yamazuki Maru,* Kobe, 100 bls. rags.
Chase National Bank, *Dagfred,* Buenos Ayres, 32 bls. bagging.
Darmstadt Scott & Courtney, *Dagfred,* Buenos Ayres, 37 bls. rags.
E. J. Keller Co. Inc., *Black Heron,* ——, 60 bls. rags.
Keene, Inc., *Black Heron,* Antwerp, 119 bls. rags.
Irving Trust Co., *McKeesport,* Dundee, 41 bls. paper stock.
Cohn & Rosenberger, Inc., *Tasmania,* Kobe, 2 bls. rags.
——, *Hansa,* Hamburg, 11 bls. rags.
E. J. Keller Co. Inc., *Pr. Harding,* ——, 182 bls. rags.
E. J. Keller Co. Inc., *Manaar,* ——, 120 bls. paper stock.
E. J. Keller Co. Inc., *Vincent,* ——, 80 bls. bagging.

HIDE CUTTINGS

American Express Co., *Ausonia,* Liverpool, 750 bags.

OLD ROPE

W. Steck & Co., *Bilderdyk,* Rotterdam, 46 coils.
Banco Com'l Italiane Trust Co., *American Farmer,* London, 41 coils.

CHINA CLAY

American Cyanamid & Chemical Corp., *Bilderdyk,* Rotterdam, 200 bags.

WOOD PULP

Pulp Sales Corp., *Rydboholm,* Kotka, 3,055 bls. sulphite.
Perkins Goodwin & Co., *Rydboholm,* Gothenburg, 153 bls. sulphite.
Castle & Overton, Inc., *Mormacsun,* Kotka, 274 bls. wood pulp, 53 tons.
———, *Saturnia,* Trieste, 80 bls. wood pulp.
Castle & Overton, Inc., *Hansa,* Hamburg, 630 bls. wood pulp, 126 tons.
Bank of N. Y. Trust Co., *Hansa,* Hamburg, 210 bls. wood pulp, 42 tons.

WOOD PULP BOARDS

Jay Madden Corp., *Rydboholm,* Kotka, 80 bls.
H. Fuchs & Son, *Rydboholm,* Gothenburg, 74 crates.
H. Fuchs & Son, *Mormacsun,* Kotka, 25 bls.

ALBANY IMPORTS

WEEK ENDING APRIL 9, 1938

Pagel Horton & Co. Inc., *Belos,* Sweden, 750 bls. wood pulp.

BOSTON IMPORTS

WEEK ENDING APRIL 9, 1938

Elliott Addressing Machine Co., *Yamazuki Maru,* Yokohama, 17 cs. paper.
Perkins Goodwin & Co., *Rydboholm,* Gothenburg, 1,000 bls. chemical pulp.
American Express Co., *Rydboholm,* Gothenburg, 4 bls. wood pulp boards.
J. Anderson & Co., *Rydboholm,* Gothenburg, 2,985 bls. chemical pulp.

PHILADELPHIA IMPORTS

WEEK ENDING APRIL 9, 1938

Union Waste Co., *Yamazuki Maru,* Kobe, 80 bls. rags.
J. M. Hagy Waste Works, *Yamazuki Maru,* Kobe, 65 bls. rags.
F. Weber & Co., *McKeesport,* London, 4 cs. drawing paper.
———, *McKeesport,* Hamburg, 200 tons kaolin.
The Borregaard Co. Inc., *Rydboholm,* Gothenburg, 441 rolls, 58 bls. paper.
Oliner Fibre Co., *Rydboholm,* Gothenburg 22 bls. wood pulp boards.
Perkins Goodwin & Co., *Rydboholm,* Gothenburg, 902 bls. sulphate.
Jay Madden Corp., *Rydboholm,* Kotka, 7 bls. newsprint.
J. W. Hampton, Jr. & Co., *Rydboholm,* Kotka, 176 rolls newsprint.
Public Ledger, Inc., *Rydboholm,* Kotka, 490 rolls.
Pulp Sales Corp., *Rydboholm,* Kotka, 3,048 bls. sulphite.
E. J. Keller Co., Inc., *Black Osprey,* ———, 126 bls. rags.
E. J. Keller Co., Inc., *Vincent,* ———, 110 bls. rags.
J. M. Maris Co., *Vincent,* Havre, 10 cs, filter paper.

BALTIMORE IMPORTS

WEEK ENDING APRIL 9, 1938

Leeson & Price, *Yamazuki Maru,* Kobe, 75 bls. rags.
Castle & Overton, Inc., *Black Heron,* Rotterdam, 984 bls. wood pulp, 177 tons.
American Express Co., *Black Heron,* Antwerp, 7 cs. stencil paper.
The Borregaard Co. Inc., *Rydboholm,* Gothenburg, 300 bls. chemical pulp.
Perkins Goodwin & Co., *Rydboholm,* Gothenburg, 185 bls. sulphate.
H. Fuchs & Son, *Rydboholm,* Gothenburg, 9 cs. pulp boards.
Pulp Sales Corp., *Rydboholm,* Kotka, 3,154 bls. sulphite.
Washington Post, *Markland,* Liverpool, N. S., 2,129 rolls newsprint.
S. Shapiro & Sons, *Tasmania,* Kobe, 65 bls. rags.
Gottesman & Co. Inc., *Kentucky,* Sweden, 500 bls. prime easy bleaching pulp.
Gottesman & Co., Inc., *Kentucky,* Sweden, 2,000 bls. prime bleached pulp.
Gottesman & Co. Inc., *Kentucky,* Sweden, 4,100 bls. prime unbleached pulp.

NORFOLK IMPORTS

WEEK ENDING APRIL 9, 1938

Carolina Bagging Co., *Black Heron,* Rotterdam, 184 bls. bagging.
Loumar Textile By Products Co., *Black Heron,* Antwerp, 83 bls. bagging.
Irving Trust Co., *Black Heron,* Antwerp, 88 bls. bagging.
Royal Manfg Co., *Black Heron,* Antwerp, 5 bls. bagging.

New Thermionic Amplifier

Bringing high sensitivity to potential measurements in high resistance circuits, this Thermionic Amplifier, drawing a negligible current, adapts any potentiometer of suitable range to the measurement of glass electrode potentials. It is also useful for measuring potentials encountered in polarization studies. In this application it is possible to supply a limited polarizing current of controlled direction and magnitude while actually measuring potential. Other uses include the measurement of corrosion and oxidation-reduction potentials. Resistors of high values can be measured at voltages at which they are used. Other applications, involving precise measurement of potential or current in circuits of extremely high resistance, will be apparent to many users.

Simple and easy to operate, it requires little manipulation other than preliminary adjustments. Readings are rapidly obtained by the routine potentiometer measurement. Built with typical L&N thoroughness of detail in design and construction, this is a particularly versatile instrument for which many uses may be found in the laboratory. Additional information may be obtained from the Leeds & Northrup Company, 4901 Stinton Avenue, Philadelphia.

Brown Pneumatic Remote Transmission

The Brown Instrument Company has just published a new folder on the Brown Pneumatic Remote Transmission System.

This system was developed by the Brown Instrument Company, for remote transmission of measurement and control in hazardous atmospheres—where the use of electrical transmission is not permissible. The system's principle of operation and the simple, rugged construction of the transmitting unit are illustrated by schematic diagrams.

The Brown Instrument Company, Wayne and Roberts avenues, Philadelphia, Pa., will be pleased to send a copy of Folder No. 94-1 to anyone requesting it.

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New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, April 13, 1938.

General demand for paper in the wholesale market while improved in the last few weeks continues "spotty", with some grades of paper in better demand while other grades show little improvement. As a whole, the paper market is showing a gradual improvement. Considering the low level of general business activity the entire paper industry is doing well. Prices of practically all grades of paper continue relatively firm. Some instances of price cutting are reported but this is more prevalent in converted paper products in comparatively small quantities.

Buying continues largely for immediate needs and it is the expectation of many in the trade that this cautious policy will continue until general business improves and there is more confidence in the future trend of business.

The contract demand for newsprint is active and shipments are going forward in normal volume.

The demand for kraft papers, sales of which have been on the uptrend since the first of the year, continues to show substantial improvement. Writing and book papers are somewhat improved for the week, but little change in demand is reported in tissues and in box board.

Chemical Pulp

Demand for chemical pulp continues very light. Although the price trend is uncertain, no change in prevailing prices are reported for this week.

Mechanical Pulp

The demand for mechanical pulp is very light. Prices continue firm and unchanged at prevailing quotations.

Old Rope and Bagging

There is practically no demand for old rope. The demand for bagging continues very light and no change in demand or prices are reported for this week.

Rags

The domestic rag market is quiet. Prices in general remain unchanged, with a reduction in prices of some grades, such as No. 1 white shirt cuttings, new unbleached, and Nos. 1 and 2 roofing rags. The foreign rag market is inactive. prices are nominal.

Waste Paper

The demand for waste paper is very light and few sales are reported. Prices are practically nominal in most grades. Reduction in the prices of white envelope cuttings, folded news and in No. 1 mixed paper are reported for the current week.

Twine

The twine market reports demand as light. Prices in general remain relatively firm and unchanged at prevailing quotations.

15-Inch Rolls Not Standard Newsprint

The Import Committee of the American Paper Industry reports that: The United States Court of Customs and Patent Appeals on Monday April 4, handed down a decision that newsprint paper in rolls 15 inches in width is dutiable as printing paper, not duty free as standard newsprint.

The Court of Appeals not only reversed the decision of the United States Customs Court in this case, but it also reversed itself on its own ruling rendered in 1933 in the case of the Cincinnati Enquirer that paper 15¾ inches in width is duty free as standard newsprint.

The Court also noted that paper in these narrow widths is used for comic supplements and special issues, and is not used in the usual news sections of the newspapers.

This ruling means that any roll paper less than 16 inches in width will henceforth be held by Customs Officials for duty.

The decision also affirms the decision in the *Christian Science Monitor* case that only such paper as was chiefly used by newspapers immediately prior to 1930 is duty free as standard newsprint.

The decision, like that in the *Monitor* case, will be a most important precedent. The Import Committee for thirteen years has been working to secure court rulings upholding its position that paper in certain sizes is dutiable and not duty free as standard newsprint. By this decision one more phase of the original newsprint definition is upheld by the highest Customs Court. From the reasoning of the Court in this case and in the *Christian Science Monitor* case it would appear that the only paper which can be imported duty free will ultimately be determined to be paper which in ingredients, size, weight and color is of the class which was chiefly used in printing regular newspapers on and prior to June 17, 1930.

The 15 inch paper was held for duty by Buffalo Customs officials upon representations made by the Import Committee, which furnished witnesses to sustain the action of those officials when the case came to trial. Acting Assistant Atty. Gen. Charles D. Lawrence personally argued the appeal before the United States Court of Customs and Patent Appeals.

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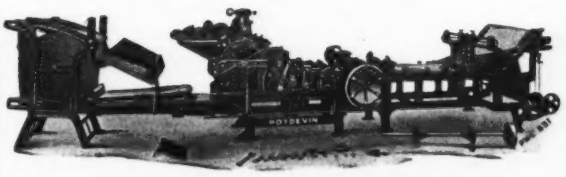

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Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, April 13, 1938.

BLANC FIXE—The demand for blanc fixe continues about on the level of last week. Prices are unchanged at prevailing quotations. The pulp is quoted at from $42.50 to $45 per ton, in bulk; the powder is offered at from 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER—The price of bleaching powder continues firm. Prices are unchanged at prevailing quotations. Bleaching powder is quoted at from $2 to $2.25 per 100 pounds, in drums, at works.

CASEIN—The demand for casein is reported as fair. Prices remain firm. Domestic standard ground casein is quoted at from 7½ to 8 cents per pound; domestic finely ground at from 8 to 8½ cents per pound. All prices in bags, car lot quantities.

CAUSTIC SODA—Prices of caustic soda remain firm and unchanged at prevailing quotations. Solid caustic soda is quoted at from $2.10 to $2.30 per 100 pounds; flake and ground at from $2.50 to $2.70 per 100 pounds; in drums, at works.

CHINA CLAY—The china clay market reports prices as firm and unchanged at prevailing quotations. Imported clay is quoted at from $14.50 to $25 per ton, ship side. Domestic filler clay is quoted at from $6.50 to $12 per ton; coating clay at from $11 to $22 per ton, at mines.

CHLORINE—The price of chlorine is firm and unchanged at prevailing quotations. Chlorine is quoted at $2.15 per 100 pounds, in single-unit tank cars, f.o.b. works.

ROSIN—The demand for rosin continues about on the level of the preceding week. "G" gum rosin is quoted at from $4.75 to $5; "FF" wood rosin at $4.75 per 280 pounds, gross weight, in barrels, at Savannah. Seventy per cent rosin size is quoted at $2.69 per 100 pounds, f.o.b. shipping point.

SALT CAKE—Prices of salt cake are reported firm and unchanged at prevailing quotations. Prices range at from $12 to $13.50 per ton; chrome salt cake at from $11 to $12 per ton, f.o.b., shipping point. Imported salt cake is offered at from $14.50 to $15 per ton, Gulf or Atlantic Seaboard, on dock.

SODA ASH—The prices of soda ash continue firm and unchanged at prevailing quotations. Prices of soda ash, in car lots, at works, per 100 pounds, are as follows: in bulk, $.90; in bags, $1.05; and in barrels, $1.35.

STARCH—The prices of corn starch are reported as firm and prices unchanged for the current week. Globe pearl is quoted at $2.60 per 100 pounds, in bags, and at $2.85 in barrels. Special paper starch is quoted at $2.70 per 100 pounds, in bags, and at $2.95 in barrels. All prices in car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Prices of sulphate of alumina continue firm and unchanged at prevailing quotations. The commercial grades are quoted at from $1.25 to $1.60 per 100 pounds; iron free at from $2 to $2.25 per 100 pounds, in barrels, at works.

SULPHUR—The sulphur market reports prices as firm and unchanged at prevailing quotations. Annual contracts are quoted at $18 per long ton, f.o.b., cars at mines. Spot and nearby car lots are offered at $21 per ton.

TALC—The prices of talc are firm and unchanged at prevailing quotations. Domestic talc is quoted at from $15 to $18 per ton, Eastern mines. Imported talc is offered at from $25 to $40 per ton, on dock.

Market Quotations

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00	@	—
Kraft—per cwt.—Delivered Zone A			
No. 1 Northern	$5.25	@	—
Superstandard	5.00	@	—
Northern Standard Wrapping	4.75	@	—
Standard Wrapping	4.50	@	—
Tissues—Per Ream—Carlots			
White No. 1	.92½	@	—
White No. 1 M. G.	.90	@	—
White No. 1½	.67½	@	—
White No. 2	.60	@	—
Anti-Tarnish M. G.	.75	@	—
Colored	.87½	@	—
Kraft	.75	@	—
Manila	.60	@	—
Unbl. Toilet, 1 M.	3.20	@	—
Bleached Toilet	5.26	@	—
Paper Towels—			
Unbleached	1.80	@	—
Bleached	2.10	@	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	$8.25	@	$10.25
No. 2 Jute	7.50	@	9.50
No. 1 Wood	4.00	@	5.25
No. 2 Wood	3.50	@	4.00
Boards, per ton—			
News	$30.00	@	—
Chip	30.00	@	—
Sgl. Mla. Ll. Chip.	45.00	@	—
Jute Lined Chip	45.00	@	—
White Pat. Coated.	57.50	@	—
Kraft Liners	55.00	@	—
Binders Boards	75.00	@	80.00

The following are representative of distributors' resale prices:—

Rag Content Bonds and Ledgers—
White, Assorted Items,
Delivered in Zone 1:

	Bonds	Ledgers
100% Rag Ext. No. 1	$41.40@$48.50	$42.55@$50.00
100% Rag	32.80@ 38.50	33.95@ 39.75
85% Rag	.....	32.26@ 37.75
75% Rag	24.75@ 29.00	25.90@ 30.50
65% Rag	21.65@ 26.25	22.80@ 27.75
50% Rag	18.70@ 22.75	19.90@ 24.25
35% Rag	15.80@ 19.25	16.95@ 20.75

Regular Colors @ $1.50 cwt. extra.
Heavy Colors @ $3.00 cwt. extra

Sulphite Bonds and Ledgers—
White, Assorted Items,
Delivered in Zone 1:

	Bonds	Ledgers
No. 1	$8.80@$10.75	$9.95@$12.00
No. 2	7.90@ 9.50	9.05@ 11.00
No. 4	7.00@ 8.50	8.20@ 10.00

Colors .75 cwt. extra.

Free Sheet Book Papers—
White, Cased Paper,
Delivered in Zone 1:

No. 1 Glossy Coated	$12.15@$14.25
No. 2 Glossy Coated	10.55@ 12.25
No. 3 Glossy Coated	9.35@ 11.00
No. 4 Glossy Coated	8.80@ 10.50
No. 1 Antique (watermarked)	8.80@ 10.50
No. 2 Offset	8.05@ 9.50
A Grade E. F.	7.90@ 9.50
A Grade S. & S. C.	8.15@ 9.75
B Grade E. F.	7.30@ 8.75
B Grade S. & S. C.	7.55@ 9.00
C Grade E. F.	7.00@ 8.50
C Grade S. & S. C.	7.25@ 8.75
D Grade E. F.	6.75@ 8.25
D Grade S. & S. C.	7.00@ 8.50

Ivory & India at $.50 cwt. extra.

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—		
Moist	33.00	@34.00
Dry	38.00	@40.00

(Delivered)

No. 1 Domestic and Canadian	27.00	@32.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—		
Prime Bleached Sulphite	3.00	@ 4.10
Prime Qualities—		
Easy-Bleaching Sulphite	2.50	@ 2.65
Strong Unbleached Sulphite	2.25	@ 2.50

(On Dock, Atlantic Ports)

Kraft Bleached	3.00	@ 3.25
Kraft Light & Strong	2.50	@ 2.75
Kraft No. 1	2.25	@ 2.50
Kraft No. 2	2.00	@ 2.25

(F.o.b. Pulp Mill)

Kraft Domestic	2.00	@ 2.10

(Delivered)

Soda Bleached	2.90	@ —

Add 60 cents per short ton, duty charges for Albany; $2.50 for Lake Ports East and $3.50 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—		
New White, No. 1	6.50	@ 6.75
Silesias No. 1	5.00	@ 5.35
New Unbleached	7.00	@ 7.25
Blue Overall	5.50	@ 6.00
Fancy	3.00	@ 3.10
Washables	2.10	@ 2.25
Mixed Khaki Cuttings	3.60	@ 3.75
O. D. Khaki Cuttings	4.35	@ 4.50

Old Rags

White, No. 1—		
Repacked	3.40	@ 3.50
Miscellaneous	2.75	@ 3.00
White, No. 2—		
Repacked	2.10	@ 2.25
Miscellaneous	1.70	@ 1.80
Thirds and Blues—		
Repacked	1.40	@ 1.50
Miscellaneous	1.25	@ 1.30
Roofing Rags—		
No. 1	.90	@ .95
No. 2	.70	@ .75
No. 3 (bagging)	.65	@ .70
No. 4	.65	@ .70
No. 5A	.65	@ .70

Foreign Rags

New Rags

New Dark Cuttings	2.25	@ 2.40
New Mixed Cuttings	2.00	@ 2.20
New Light Silesias	5.50	@ 5.75
Light Flannelettes	5.50	@ 5.75
New White Cuttings	7.00	@ 7.50
New Light Oxford	4.00	@ 4.50
New Light Prints	3.00	@ 3.25

Old Rags

No. 1 White Linens	7.50	@ 8.00
No. 2 White Linens	6.50	@ 7.00
No. 3 White Linens	4.50	@ 5.00

Since 1901

Dietz Machine Works

DIETZWORKS PHILA PA

MANUFACTURERS

TOILET ROLL CONVERTING MACHINES
TOWEL ROLL CONVERTERS
EMBOSSING EQUIPMENT
ANILINE PRINTERS
TOWEL INTERFOLDING MACHINES
ROTARY CARD CUTTERS
SLITTERS FOR VULCANIZED FIBRE

126-128 W. Fontaine St.
Sta. "O" Phila., Penna.

CASEIN

Uniform Quality

Dependable Service

Special Types to Meet Unusual Requirements

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350 Madison Avenue, New York, N. Y.
40 Years of Service to Users of Casein Products

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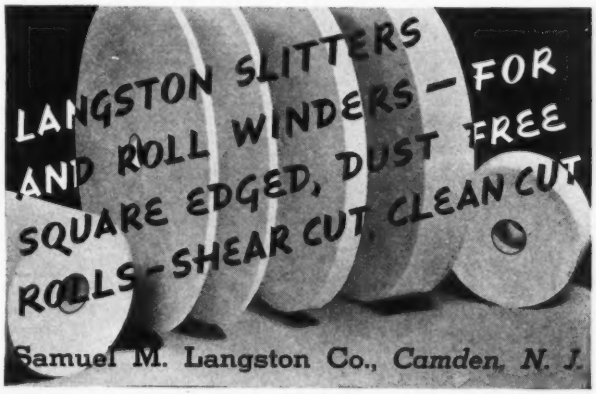
Telephone Murray Hill 2-3570

WOOD PULP

Cable Address: "LAGERLOF NEWYORK"



Mill Cogs

ON SHORTEST POSSIBLE NOTICE

We make all kinds of Mill Cogs and have special facilities that will be of great service to you. We make a specialty of "ready dressed" cogs which are

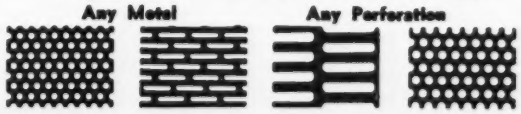
READY TO RUN

the moment driven and keyed. Write at once for circular "G" and instruction sheets free.

THE N. P. BOWSHER CO.
South Bend, Ind.
Established 1882

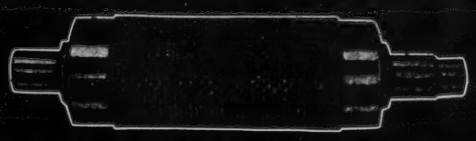
Pulp and Paper Mill Screens
Of Stainless Steel—Copper—Bronze—Monel—
Chemical Resisting Alloys
Perforations that are accurate in size

Any Metal Any Perforation



The Harrington & King Perforating Co.
5652 Fillmore St. Chicago, Ill. 114 Liberty St. New York, N.Y.

EMBOSSING ROLLERS



ROEHLEN ENGRAVING WORKS INC.
324 ST. PAUL ST.
ROCHESTER, N. Y.

DIAMOND VULCANIZED FIBRE
DILECTO PHENOL FIBRE
VULCOID MICABOND
DILOPHANE

CONTINENTAL-DIAMOND
FIBRE COMPANY
NEWARK, DELAWARE

No. 4 White Linens.	2.25	@	3.25
No. 1 White Cotton.	4.25	@	4.75
No. 2 White Cotton.	3.25	@	3.75
No. 3 White Cotton.	2.50	@	3.00
No. 4 White Cotton.	1.90	@	2.20
Extra Light Prints..	2.00	@	2.40
Ord. Light Prints...	1.75	@	2.15
Med. Light Prints...	1.55	@	1.95
Dutch Blue Cottons..	2.25	@	2.50
French Blue Linens..	3.00	@	—
Checks and Blues...	2.00	@	—
Linsey Garments....	1.90	@	2.00
Dark Cottons.....	1.50	@	1.60
Old Shopperies.....	1.30	@	1.45
New Shopperies.....	1.45	@	1.50
French Blues.....	2.25	@	2.50

Old Rope and Bagging

(Prices to Mill f. o. b. N. Y.)

Gunny No. 1—			
Foreign	2.20	@	2.25
Domestic	2.00	@	2.15
Wool Tares, light....	1.50	@	1.75
Wool Tares, heavy..	2.00	@	2.10
Bright Bagging.....	1.60	@	1.70
Manila Rope—			
Foreign	3.00	@	3.25
Domestic	2.75	@	3.00
Jute Threads.....	2.75	@	3.00
Sisal Strings.....	1.75	@	2.00
Mixed Strings.....	.60	@	.70

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	2.25	@	2.35
Ordinary Hard White No. 1....	1.90	@	2.00
Soft White No. 1..	1.80	@	2.20
Flat Stock—			
Stitchless	.70	@	.80
Overissue Mag.....	.60	@	.70
Solid Flat Book...	.55	@	.60
Crumbled No. 1...	.40	@	.45
Ledger Stock.....	.90	@	.95
New B. B. Chips....	.15	@	.20
Manila—			
New Env. Cut....	1.85	@	2.00
New Cuttings.....	1.50	@	1.60
Old Kraft Machine— Compressed bales..	.70	@	.80
News—			
No. 1 White News	1.25	@	1.30
Strictly Overissue.	.45	@	.50
Strictly Folded....	.20	@	.25
No. 1 Mixed Paper..	.05	@	.10

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.12½	@	.14
White Hemp.....	.13½	@	.15
Fine Polished—			
Fine India.....	.16	@	.18
Unpolished—			
Box	.09	@	—
Paper Makers.....	.08	@	.09½
Tube Rope.....	.10¾	@	.11½
Wall Paper.....	.10¾	@	.11½
Wrapping	.12	@	.14
Soft Fiber Rope...	.10¾	@	.11¼
Cotton	.16	@	.22

(Hard Fiber)

Medium Java.....	.09	@	.10
Mex. Sisal.....	.08½	@	.09½
Manila	.18	@	.25
Domestic	2.25	@	2.50
Sisal Rope.....	1.65	@	1.75
Mixed Rope.....	.50	@	.55
Transmission Rope...	1.25	@	1.50
Soft Jute Ropes.....	1.90	@	2.00
Jute Carpet Threads.	1.00	@	1.50
Gunny Bagging—			
Foreign	2.20	@	2.25
Domestic	1.75	@	1.85
Bleachery Burlap....	3.25	@	3.75
Scrap Burlap—			
Foreign	1.65	@	1.80
Domestic	1.40	@	1.50
Scrap Sisal	1.25	@	1.50
Scrap Sisal for Shredding	1.75	@	1.90
Wool Tares, Heavy..	1.50	@	1.60
New Burlap Cuttings	1.85	@	2.00
Aust. Wool Pouches.	2.75	@	3.00
Heavy Baling Bagging	1.75	@	2.00
Paper Mill Bagging.	1.50	@	1.60
No. 2 Bagging.....	.50	@	.60

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	.03	@	.03¼
New White No.1..	.06¾	@	.07
New White No. 2.	.05	@	.05½
New Light Flannelettes	—	@	.05½
Silesias No. 1.....	.05¾	@	.05½
New Black Silesias..	.03¾	@	.04
Silesias No. 1			
Soft Unbleached.....	.06¾	@	.07
Blue Cheviots.....	.05	@	.05½
Fancy	.03	@	.03¼
Washable	.02¾	@	.03
Cottons—According to grades—			
Blue Overalls.....	.05	@	.05½
New Black, soft...	.03¾	@	.04
Khaki Cuttings....	.03¾	@	.03¾
D. D. Khaki.....	.04	@	.04½
Corduroy	.02¾	@	.03
New Canvas.....	.07¼	@	.07¾
B.V.D. Cuttings.....	.06¾	@	.07¼

Domestic Rags (Old)

(F. o. b. Boston)

Canvas	.04½	@	—
White No. 1—			
Repacked	—	@	2.75
Miscellaneous	2.50	@	2.75
White No. 2—			
Repacked	1.90	@	2.00
Miscellaneous	2.00	@	2.25
Twos and Blues.....	1.75	@	2.00
Third and Blues—			
Repacked	1.37½	@	1.75
Miscellaneous	1.25	@	1.62½
Black Stockings.....	3.90	@	4.00
Roofing Stock—			
No. 1.....	1.00	@	1.10
No. 2.....	.75	@	.85
No. 3.....	.65	@	.70

Foreign Rags

(F. o. b. Boston)

Dark Cottons.....	1.00	@	1.10
Dutch Blues.....	2.75	@	2.90
New Checks and Blues	2.85	@	3.00
Old Fustians.....	2.50	@	2.60
Old Linsey garments.	1.75	@	1.90
New Silesias.....	6.00	@	6.50

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White, No. 1.	.05½	@	.06
New White, No. 2.	.03½	@	.04
Light Silesias.....	.04½	@	.05
Silesias, No. 1....	—	@	.04½
Black Silesias, soft.	.03	@	.03½
New Unbleached..	—	@	.06
Washable, No. 1..	.01¼	@	.01½
Blue Overall.....	.04	@	.04½
Cottons—According to grades—			
Washable No. 2...	.01	@	.01¼
New Blue.....	.01	@	.01¼
Fancy Percales....	—	@	.02½
New Black Soft...	.03	@	.03½
New Light Seconds	—	@	.04½
New Dark Seconds	.50	@	.75
Khaki Cuttings—			
No. 1 O. D.....	.03½	@	.04
No. 2 Mixed.....	.02	@	.02½
Corduroy	—	@	.02
New Canvas.....	.05	@	.05½
New Black Mixed.	.02½	@	.02¾

Domestic Rags (Old)

White No. 1—			
Repacked	2.50	@	3.00
Miscellaneous	2.25	@	2.50
Thirds and Blues—			
Miscellaneous	1.00	@	1.25
Repacked	1.00	@	1.25
Black Stockings (Export)	3.00	@	3.50
Roofing Stock—			
Foreign No. 1....	—	@	.75
Domestic No. 1...	—	@	.75
Domestic No. 2...	.50	@	.65
Roofing Bagging..	.80	@	.90

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	1.50	@	1.75
Domestic	1.50	@	1.75
Manila Rope.....	3.00	@	3.25
Sisal Rope.....	1.75	@	2.00
Mixed Rope.....	.75	@	1.00
Scrap—			
No. 1.....	—	@	1.25
No. 2.....	1.00	@	1.25
Wool Tares, heavy..	3.25	@	3.50
Mixed Strings.....	1.00	@	1.10
No. 1 New Light Burlap	3.00	@	3.50
New Burlap Cuttings	1.75	@	2.00

Old Papers

(F. o. b. Phila.)

Shavings—			
No. 1 Hard White.	2.35	@	2.40
No. 2 Hard White.	2.00	@	2.10
No. 1 Soft White..	2.00	@	2.10
No. 2 Soft White..	1.40	@	1.50
No. 1 Mixed.....	.70	@	.75
Solid Ledger Stock..	1.50	@	1.60
Ledger Stock, white.	1.25	@	1.30
Ledger Stock, colored	.85	@	.90
No. 1 Books, heavy..	.85	@	.90
Manila Cuttings.....	1.50	@	1.75
Print Manila.....	.45	@	.50
Container Manila....	—	@	.40
Kraft Paper.....	.90	@	.95
No. 1 Mixed Paper..	.25	@	.30
Straw Board Chip...	.25	@	.30
Binders Board Chip.	.25	@	.30
Corrugated Board...	.50	@	.55
Overissue News.....	.55	@	.60
Old Newspapers	.30	@	.35

BOSTON

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White.	2.25	@	2.40
No. 1 Soft White..	1.85	@	2.15
No. 2 Mixed.....	.75	@	.80
Solid Ledger Books..	1.50	@	1.75
Overissue Ledger Stock	1.30	@	1.50
Mixed Ledgers.....	.85	@	.90
No. 1 Books, heavy..	.65	@	.75
No. 1 Books, light...	.65	@	.75
Crumpled Stitchless Book Stock.....	.55	@	.65
Manila Env. Cuttings	1.60	@	1.70
Manila Envelope Cuttings, extra quality	2.00	@	2.10
No. 1 Old Manila....	.85	@	.95
White Blank News..	1.30	@	1.40
No. 1 Kraft.....	.85	@	.90
Mixed Papers.....	.10	@	.12½
Print Manila.....	.45	@	.50
Container Manilas...	.27½	@	—
Old Newspapers.....	.25	@	.32½
Paper Wool Strings..	—	@	.50
Overissue News.....	.45	@	.50
Box Board Chips....	.20	@	.25
Corrugated Boxes....	.25	@	.27½
Kraft corrugated boxes	.25	@	.30
Screenings wrappers.	.45	@	.50

Bagging

(F. o. b. Boston)

Manila Rope—			
Foreign	2.50	@	2.75

CHICAGO

Old Papers

(F. o. b. Chicago)

Shavings—			
No. 1 White Envelope Cuttings....	3.15	@	3.25
No. 1 Hard White.	2.50	@	2.60
No. 1 Soft White..	2.05	@	2.10
Ledger & Writings..	1.30	@	1.40
Solid Books.....	1.20	@	1.25
Blanks	1.40	@	1.50
Krafts	.90	@	1.00
New Kraft Cuts.....	1.70	@	1.80
Manila Env. Cuts...	2.15	@	2.25
Ex. No. 1 Manila...	2.15	@	2.25
Print Manila.....	1.70	@	1.80
Overissue News.....	.60	@	.70
Old Newspapers—			
No. 1 Folded News	.45	@	.50
No. 1 Mixed Paper	.35	@	.40
Roofing Stocks—			
No. 1.....	2.00	@	2.25
No. 2.....	1.85	@	2.00

TORONTO

Paper

Bonds and Ledgers

Delivered

No. 1 White	.35½	@	.36½
No. 1 Tints	.36½	@	.37½
No. 2 White	.26½	@	—
No. 2 Tints	.27½	@	—
No. 4 White	—	@	.1350
No. 4 Tints	.16	@	.1650
No. 5 Bond—White .	11.35	@	—
No. 5 Bond—Tints .	12.35	@	—
No. 5 Bond—Golden Rod	13.35	@	—
No. 5 Ledger—White .	.1185	@	—
No. 5 Ledger—Tints.	.1285	@	—
No. 6 Bond—White .	10.75	@	—
No. 6 Bond—Tints .	11.25	@	—
No. 6 Bond—Golden Rod	12.75	@	—
No. 7 Bond—White .	9.10	@	—
No. 7 Bond—Tints .	9.60	@	—
No. 7 Bond—Golden Rod	11.10	@	—
Book—			
No. 1 M. F.	7.10	@	7.35
No. 2 M. F.	6.85	@	7.20
No. 3 M. F.	5.60	@	6.20
No. 1 S. C.	7.60	@	7.85
No. 2 S. C.	7.10	@	7.35
No. 3 S. C.	6.10	@	6.35
No. 1 Coated and Litho	12.50	@	—
No. 2 Coated and Litho	11.00	@	—
No. 3 Coated and Litho	9.50	@	—
Coated tinted.....	13.50	@	—
Wrapping—delivered—			
Rag Brown.....	4.85	@	5.55
White Wrap.....	4.00	@	—
"B" Manila.....	4.90	@	6.25
No. 1 Manila.....	5.50	@	7.00
Fiber	5.50	@	—
Kraft, No. 2.....	5.50	@	—

(F. o. b. Cars, Toronto)

News, per ton—			
Rolls (contract)..$46.00		@	—
Sheets 54.00		@	—

Pulp

Ground wood.....29.50		@	—
Unbleached Sulphite.54.00		@	—
Book (Class 1).....64.00		@	—
Writing (Class 2)....62.00		@	—
Select (Class 3).....63.00		@	—
Kraft 50.00		@	—
Soda 56.00		@	—

Old Waste Paper

(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut...	2.25	@	—
Soft White.....	2.15	@	—
White Blk. News..	1.25	@	—
Book and Ledger—			
Flat Magazine and Book Stock (old)	.80	@	—
Light and Crumpled Book Stock.	.75	@	—
Ledgers and Writings	1.10	@	—
Manilas—			
New Manila Cut...	1.35	@	—
Printed Manilas...	.55	@	—
Kraft	1.00	@	1.55
News and Scrap—			
Strictly Overissue.	.55	@	—
Strictly Folded....	.50	@	—
No. 1 Mixed Paper..	.40	@	—

Domestic Rags

(Price to mills, f. o. b. Toronto)

No. 1 White Shirt Cuttings	.06¾	@	.07
Fancy Shirt Cuttings	.02½	@	.03¼